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ABSTRACT

An evaluation of the first year of "The Electric Company" is provided. Volume 1 is comprised of the following chapters: I. Introduction; II. Preparing for the Evaluation (Research Design and Sampling Procedures; Field Operations; The Treatment--the in-school viewing treatment, the at-home viewing treatment, and the content of The Electric Company--Measuring Instruments: General Considerations, tests for Children, Parent Questionnaires, Teacher Questionnaires, Observations of the Classrooms, Attendance Records, Viewing Records, and Content Analysis; III. Results--The Questions to Be Asked; Description of the Sample; Analyses of the In-School Viewing Experiments; and Analyses of the At-Home Viewing Experiments; and IV. Summary and Conclusions--Summary of Project Activities; Summary of Results; Conclusions; and Future Research. Appendixes present: Goals of the Electric Company; Description of the Electric Battery and Sample Items; Pretest Parent Questionnaire; Posttest Parent Questionnaire; Pretest Teacher Questionnaire; Posttest Teacher Questionnaire; Observation Form; Viewing Record; and Content Analysis. Seven abstracts are provided of the six viewing experiments and of the overview of significance levels of tests and subtests for the in-school experiments in Fresno and Youngstown. Volume 2 consists of 57 tables which provide the study data. (DB)

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READING WITH TELEVISION:

AN EVALUATION OF THE ELECTRIC COMPANY

Volume 1

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A report to the Children's Television Workshop

Educational Testing Service
Princeton, New Jersey
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Acknowledgments

There was a great deal of discussion in our group at ETS about what awards to present to the many people who have helped us with this evaluation. In other years when evaluating Sesame Street we gave Earnies for those who earned our deepest appreciation, and we had even thought of giving Oscars to those who worked hard but who were rather grouchy in the process. However, we feel that Earnies and Oscars are inappropriate awards to give when we have a new series being evaluated -- we are now concerned in The Electric Company with reading rather than preschool education. We considered awarding Dicks and Janes to those who have helped us. Unfortunately, as some of our colleagues pointed out, we ran the risk of being misinterpreted.

What we are presenting this year is known, appropriately, as The Last Word Award. While we do not expect that it will increase the reader's sight vocabulary as the last word feature was meant to do on The Electric Company, we do think it will shed light on the energy exerted by many people. We think, too, that it will indicate the utility of their efforts.

The Last Word Awards

For The Last Word Award for efficiently organizing and executing the data collection in each of the sites:

Cecelia Ham, Fresno, California

Willette Sharpe, Richmond, Virginia

Edward Rakocy, Youngstown, Ohio

Clyde Aveilhe, Washington, D. C., with the assistance of Ralph Love

For The Last Word Award for administrative leadership in making possible the research in each of our sites:

Harriet Jowett, Consultant, and Ernest Poore, County Superintendent of Schools, Fresno, California

Robert L. Pegues Jr., Assistant Superintendent (now Superintendent), and Clay R. Folsom, Director of Instruction and Curriculum, The Public Schools, Youngstown, Ohio

Ruth Lewis, Director, Language Arts Department, and James Tyler, Assistant Superintendent, Board of Education, Richmond, Virginia

Mildred Cooper, Office of Research of the Washington, D. C. Public Schools, and David Nolan, Director, Washington, D. C. Office, Educational Testing Service

Unfortunately, it is not possible to give individual awards, except generically, to each of the hundreds of teachers, principals, testers, and tester-aides whose cooperation made this evaluation possible.

Within ETS, a number of Last Words must certainly be awarded:

Adele Lechowicz for her excellent, unflappable secretarial services, and for putting up with our humor

Tomi Lubrano, for her work on the MIST typewriter

Gina Wilson, for coordinating the field efforts

Darl Walter for organizing the coding of the thousands of tests and questionnaires

Pat Clyde, Tom Deering, and Tita Rosenthal for coding

Sandi Landes, for the art work that made the tests so attractive

Thomas Barrows and Scarvia Anderson for their valuable comments on our first draft

Alice Gerb and John Ferris for their programming efforts. We

were constantly amazed at their speed, helpfulness, and resiliance. (When you have just programmed a big analysis and find out that it is no longer justified because of the results of an earlier analysis, you need to be resiliant.)

Donald Rubin and Albert Beaton for their statistical advice. When it comes to design and analysis, Al and Don already have had The Last Word but they are officially recognized anyway.

Gerry Bogatz and Sam Ball would have liked to award themselves a Last Word (under which category they do not know). However, it is apparent, after four years of their working together, that neither of them is likely to get The Last Word.

Instead, they take great pleasure in giving The Last Word Awards. As all of the winners have shown in their work, it is better to give than to receive; and the authors realize this is especially so when it comes to The Last Word.

Samuel Ball and Gerry Ann Bogatz

NOTES

All tables referred to in this report are bound in a separate volume. Abstracts of tables are presented within the text of the report for ease in reading, but readers should consult Volume 2 for the complete data presentations. The tables were placed in a separate volume so that the flow of the discussion would not be interrupted and so that the readers could have the relevant table in front of them as they read the text.

CHAPTER I. INTRODUCTION

A. Background: Children's Television Workshop and "The Electric Company"

In 1968, Children's Television Workshop (CTW) was established. Its initial purpose was to develop and present a daily television show for preschoolers -- one that would both entertain and educate. The show, Sesame Street, quickly gained substantial public approval and a large viewer audience. As well, the evaluation which was conducted by Educational Testing Service (ETS) indicated that Sesame Street was attaining many of the goals it had set itself.[1]

There were, according to its developers,[2] four major features that seemed to facilitate Sesame Street's public success. The budget allowed for an 18-month pre-broadcast period thereby ensuring that a considerable amount of research and development took place; the program was created through the interaction of television producers and educational researchers. There was sufficient funding to allow the more expensive television production techniques to be used where it was felt they were appropriate vehicles for the educational message; and information, promotion, and utilization efforts were greater than those ever made with a public television program.

At the end of the first year of Sesame Street, CTW developed a proposal to produce a second television show, one that was to be aimed at children in the primary grades and with reading the content area.

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[1] See Ball, S. and Bogatz, G., The First Year of Sesame Street: An Evaluation. Educational Testing Service, PR 70-15, October, 1970.

Bogatz, G. and Ball, S, The Second Year of Sesame Street: A Continuing Evaluation. Educational Testing Service, PR 71-21, November, 1971.

[2] See Palmer, E. and Gibbon, S. Pre-Reading on Sesame Street. Children's Television Workshop, New York. December, 1970.

The proposal was funded by a consortium that included the United States Office of Education, Ford Foundation, Carnegie Corporation, John and Mary Markle Foundation, and Mobile Corporation.

As in the case of Sesame Street, this new reading show, to be called The Electric Company, was developed over a period of more than twelve months. The development process involved a series of seminars which were conducted to establish the goals of the show, the target audiences of major concern, and some possible television production techniques to be used in the show. On the basis of these seminars and follow-up discussions, the behavioral goals of The Electric Company were formulated. (These goals were divided into two major segments -- strategies for symbol/sound analysis and strategies for reading for meaning. The goals statement is presented in full here as Appendix A.)

A CTW formative research group was established by Dr. Edward L. Palmer, CTW's Vice-President for Research. The formative research team conducted a number of studies under the direction of Ms. Barbara Fowles and, later, Dr. Vivian Horner. These studies looked at the existing competencies and problems of the target audiences, assessed the appeal of various types of television production techniques, and, later, pretested materials produced specifically for the show.

With the guidance of the goals and the formative research, the production staff of CTW produced 130 half-hour shows. The Electric Company began telecasting on October 25, 1971 on noncommercial and commercial stations in the United States and continued broadcasting five days a week through April 1972. Typically, the stations tele-

cast the show during a school hour and then repeated it in the late afternoon. Some stations also repeated the five shows for the week during the following weekend.

In the following sections we shall describe how ETS became involved in the summative evaluation of The Electric Company.

B. Background: Summative Evaluation

On May 5, 1971, CTW distributed a Request for Proposal (RFP) to evaluate the educational impact of The Electric Company. The RFP specified that the evaluation should be national (or multi regional) in scope. The sample should be chosen to reflect the target audience envisaged for the show in the following proportions:

Target audience	Percent of the total sample
First graders at all levels of reading	20%
Second graders in the lower half[1] in reading achievement	40%
Third graders in the lowest quarter in reading achievement	20%
Fourth graders in the lowest quarter in reading achievement	20%

The RFP called for a design that would include the pretesting and post-testing of sampled children. The evaluation was to address itself to answering such specific questions as: does the show prevent reading failure among second graders and provide remedial help among third and fourth graders; do the viewing circumstances (home viewing or school viewing) mediate the effectiveness of the show; are there differential effects on children of the urban poor, rural poor, and middle income families; are there any attitude changes in children or teachers attributable to the show; how does the show interact with major approaches to the teaching of reading; what are the teachers' attitudes toward the show.

[1] In relation to a national norms distribution.

As well as these specific questions the RFP also called for a number of other studies that would indicate whether the show had special effects on Spanish-background children, different effects on boys compared with girls, greater effects on children who viewed more, different effects when viewed on color versus black and white sets, or when viewed by classes whose teachers were given teacher guides.

The summative evaluation of The Electric Company was initiated by CTW in conjunction with its various funding agencies and its research advisory board. ETS wrote its proposal, which was subsequently accepted, trying where practicable to be responsive to the evaluation goals outlined. We did not address our work to obtaining answers to all the questions outlined in the RFP. There were limitations of time and money and some priority ordering took place. Even though we had to focus on a number of questions posed in the RFP, it was possible nonetheless to add other questions of our own.

It should be pointed out at this stage that there were various important evaluation questions not posed in the RFP and not posed independently by us. Not every relevant question could be addressed even by a number of evaluation studies -- evaluation research costs money and funding agencies have to strike a reasonable balance among program development, program dissemination, and program evaluation. It should be remembered too that this evaluation concerns the first year of a new educational program. The show has been continued into a second year, and quite properly, evaluation also continues into

the second year.[1] Evaluations conducted after these initial efforts should be based on earlier findings, be aimed at replicating these findings, should look for related effects, and should strive to answer questions not previously asked. Of course each phase in the evaluation cycle may also be expected to raise new research questions.

Put negatively, the evaluation to be described in the following pages does not attempt to answer questions concerning cost benefit and cost effectiveness, alternative ways of reaching the same goals, the worthiness of the goals selected for the show, the effectiveness of the show on various important (but non-target) groups such as preschool-aged children, educable mentally retarded children, emotionally disturbed children, and illiterate adults. Furthermore, the number of potential positive and negative side-effects is legion and, while we did check on some of them, many were beyond the province of our first year evaluation. These include changes among viewers in academic subjects other than reading, in library borrowing, in creative and report writing, and in child-teacher interactions. Further, we did not look at effects of home viewing on younger or older siblings of sampled target children, the effects of the show on other television shows, and the effects of the show on the teaching styles of viewing teachers. All these (and more) are legitimate questions. They did not come at the top of the priority list developed by us from the RFP and from operational considerations. We welcome the work of other researchers, especially those with backgrounds in sociology,

[1] We are currently conducting a follow-up study of some of our first year sample.

economics, anthropology and philosophy. All will be needed for a properly rounded set of evaluation studies.

In positive terms, this evaluation is primarily interested in discovering whether the first year of The Electric Company achieved its main intended outcomes with its major categories of target audiences. We also looked at some non-target audiences, for some possible unintended outcomes, and for some potentially important moderating variables. In general it will be seen that we addressed our evaluation to most of the questions posed in the RFP along with some questions we independently deemed to be of high priority and within the confines of practicability. We think that this evaluation is a first step in the overall evaluation of The Electric Company.

CHAPTER II. PREPARING FOR THE EVALUATION

A. Research Design and Sampling Procedures

Two designs were developed for this study. Each was intended to isolate the effects of viewing The Electric Company in a different setting -- one setting was viewing in school and the other was viewing at home.

In order to study the effects of viewing in school we sought sites where The Electric Company was to be telecast solely during school hours. This would allow the establishment of a group whose viewing in school could be ensured (experimental) and a group which would not be able to view the show at all (control group). That is, the group that would not be seeing the show in school would not be able to go home after school and see the show as it was not shown then. Further the experimental group (in-school viewers) would also be unable to view at home.

For the home viewing design we needed sites where telecasting of the show included a daily presentation after school hours. The show could also be telecast during school hours provided sampled children (experimental and control) could not view it then.

All sites also had to have the following characteristics. They had to have a school system large enough to have a substantial number of classrooms in grades one through four, a substantial number of children experiencing difficulty in reading, and a variety of reading programs in the schools to allow some assessment of the interactions between type of reading program and viewing of The Electric Company.

Given the constraints of time and cost, the problems inherent in large scale field operations, and the site characteristics necessary to conduct the two studies, we decided to work in four sites rather than attempt a representative sampling of sites. Since the two designs required quite different schedulings of the show, a single site could not be used to assess the effects of both viewing conditions.

The selection of sites to conduct the in-school viewing evaluation proved to be the more difficult since most areas in the nation, especially those with relatively large school systems, were telecasting The Electric Company both during and after school hours. However, two sites were found that fulfilled the necessary requirements -- Fresno, California and Youngstown, Ohio. The Fresno County area has no public television station but does have a closed-circuit television system in its schools. CTW and ETS arranged for the Fresno County Department of Education to receive a full set of tapes of the show during the telecast period, and the school systems within the county's jurisdiction received the show on closed-circuit television. Fresno County not only provided an appropriate and cooperative milieu in which to work, but it also had a desirable variety of children (urban, rural, white, and Spanish background).

The second site for the in-school viewing evaluation, Youngstown, Ohio, also had no public television station in the period in which our study was being conducted. However, the local affiliate of CBS in Youngstown did agree to telecast The Electric Company during school

hours as a public service. Youngstown provided both an urban setting in the Midwest and a curious historical coincidence. William McGuffey, whose reading books were so famous in earlier generations, was born and educated in Youngstown, Ohio. From McGuffey's Readers to The Electric Company.

The two at-home viewing sites were Richmond, Virginia, and Washington, D. C. Both provided us with large urban areas and both were served by UHF rather than the more audience-attracting VHF television stations. Sites served by UHF were chosen in the hopes of preventing massive viewing of the show by control children. The disadvantages of these sites were that they were close geographically (though they represent different kinds of urban environments), and they contained a disproportionately high percentage of black children (especially Washington, D. C.).

The sampling plan was the same in all four sites. First we obtained a listing of schools and classrooms which contained a preponderance of target children -- namely, first graders of all levels of reading achievement, second graders in the bottom half of their grade in terms of national norms of reading achievement, and third and fourth graders in the lowest quarter of their grade in terms of national reading norms. The next step was to ask school principals to pair such classes in their schools within each grade on the criterion of performance in reading or reading readiness. Some principals explained that in their schools children were grouped by ability so that no classes could be paired on this criterion. Such schools were not used in the study. Almost all principals were able

to provide us with the pairings as requested. Within each school, the local coordinator was instructed to randomly assign one member of each pair of classes to a viewing condition and the other to the control condition. This was done for 20 pairs of first grade classes, 40 pairs of second grade classes, 20 pairs of third grade classes, and 20 pairs of fourth grade classes in each of the four sites. (See Table 1 for the sampling design.)

The studies then entailed the pretesting of sampled classes in all four sites during late September and early October, 1971. The experimental classrooms received the experimental treatment during the following six months, and all classes were posttested in May, 1972.

In subsequent sections of this chapter, we shall present a description of the field operations, the experimental treatments, and the measuring instruments used in the studies.

B. Field Operations

In the in-school and at-home viewing sites, the school classroom was our unit of sampling and analysis. The initial contacts in each site and the ultimate approval to work in each site were therefore made with the school systems. At the request of the school systems in Fresno and Youngstown, ETS negotiated fixed-cost contracts whereby each school system provided the cooperation and the local personnel to carry out the study. In Richmond and Washington, the school systems preferred that ETS hire all personnel and supervise all activities.

While the financial arrangements differed in the sites, the field operations were essentially the same. In each site, the initial act was to appoint a local coordinator to oversee the field operations. In three cases, the coordinator was or had recently been an employee of the school system in the capacity of teacher or substitute teacher. In Washington, a new employee of the ETS regional office in that city had recently left the Washington schools and became the local coordinator.

Since all local coordinators had strong ties with their schools, and since ETS had previously gained the schools' cooperation, the responsibility for hiring testers was given to the coordinators. All testers and tester-aides were people who had previous experience with young children, usually as teachers or substitute teachers. The local coordinator also had responsibility for supervising the work of the testers and aides during pretesting and posttesting, for scheduling testing sessions with classes, for controlling the quality of data by checking each document before forwarding materials to ETS, and for

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coordinating all activities by serving as liaison between testers and ETS and between the local school system and ETS. Coordinators in Richmond and Washington were also responsible for handling all fiscal matters related to field operations.

A two-day briefing and training session for coordinators was held at ETS in early September, 1971. At that session, the project was explained and coordinators were instructed in sampling and testing procedures. Coordinators then trained their local testers and aides to administer the tests.

During the first week of testing in each site, an ETS staff member helped in the supervision of testing and observed each tester and aide during an entire testing session to ensure uniformity of procedures. The ETS person also supervised the selection of classes for the study and the randomized assignment of the experimental treatment. After the first week, the coordinators assumed full responsibility for monitoring the testing.

After the pretesting and the collection of parent and teacher questionnaires, coordinators checked the data for completeness. This was a lengthy process given the 100 classes and approximately 2500 children who were tested in each site, but it ensured a minimum number of rejected tests. At ETS, each test was again checked before being sent to keypunch. Occasionally, incomplete tests were found and they were returned to the sites for completion. All of this was somehow accomplished in the one month before the show began. This process was repeated during the posttest period in May, 1972.

Between the two testing periods, the coordinator was responsible for ensuring the maintenance of the experimental and control treatments. Each classroom in the study was visited at least once a month. In the case of the two at-home viewing sites, teachers were reminded to encourage (or not-encourage) viewing; in the two in-school viewing sites, teachers were reminded about their obligation to view (or not-view) the show daily. Coordinators also supervised the administration and collection of viewing records. The final job of each coordinator during the six months of the show was the monthly observation of all experimental classes.

C. The Treatment

In two sites the treatment being evaluated was viewing of The Electric Company in class and in two sites the treatment was viewing the show in the children's own homes.

1. The In-school Viewing Treatment

In Fresno and Youngstown, each experimental classroom was supplied with a television set, and the teacher was asked to turn the set on to The Electric Company every school day whenever feasible. Control teachers agreed not to show the program in their classrooms. In Fresno all television sets were black and white receivers normally used as part of that county's closed-circuit TV system. In Youngstown, 25 of the experimental classes were given 21 inch black and white sets and 25 were given 21 inch color sets. The selection of color TV classes was random within grades and enabled us to conduct a study of the effects of viewing in color versus black and white. Each experimental teacher was given copies of CTW's Electric Company Guide which was published every two weeks and contained information about the shows in a two-week period as well as suggestions for lessons and games as a follow-up to each show.

Aside from the television sets and the guides, no other supplies or information were given to the viewing teachers. The time of the show was of course set and was the same each morning, but the teacher was left free to decide which school activity the show would supplant. Teachers were also free to use or not use the show as a stepping stone to other classroom activities. In

other words, the evaluation of The Electric Company in these sites was a naturalistic one.

2. The At-home Viewing Treatment

In Richmond and Washington, the evaluation was directed toward assessing the effects of the show on children who viewed in their own homes. No television sets were supplied to any classes. Rather, teachers of experimental classes were asked by ETS and by school personnel to "encourage" their children to view the show at home and to refrain from showing the program in school. Encouragement of children by the teacher consisted of asking the children to watch The Electric Company each day after school and discussing the show in class to instill interest. Teachers in the at-home sites were not given any other direction or instruction about the use of the show, but were given copies of the Electric Company Guide. The not-encouraged classes in these sites were not discouraged from viewing the show (which might have had the effect of creating curiosity about the show and therefore viewing). Rather, non-encouragement came in the form of not mentioning the show at all.

"Viewing," is a convenient short-hand way of labelling the treatment. The actual in-school experimental manipulation was asking teachers to turn on the show each day in order to have the children view it in a way the teacher deemed to be educationally sound. This manipulation was completely consistent with (and, therefore, confounded with) the children's actual in-school viewing. Perhaps then, strictly speaking, the treatment was the gaining of the teachers' cooperation, a primary

dependent variable was the children's viewing the show, and a secondary dependent variable was performance on the tests used to assess the children. By the same token, the actual at-home experimental manipulation was getting the teachers to encourage the children to view the show at home. However, here, the actual viewing could not be expected to be completely consistent with the teachers' acting as requested (as occurred with the in-school experiments). Not all children in classrooms where children were encouraged to view would, in fact, view. Thus, though we refer to "viewing" as the treatment in the in-school and "encouragement" as the treatment in the at-home experiments, we realize the complexities of the underlying phenomena, and the analyses, results, and conclusions, hopefully, will benefit from this realization.

3. The Content of The Electric Company

Viewing of The Electric Company was the focus of both the in-school and at-home experiments. The series consisted of 130 half-hour programs broadcast five days a week (Monday through Friday) for 26 weeks. According to CTW,[1] the show was designed to teach second, third, and fourth graders with reading difficulties by supplementing classroom reading instruction. Given the limited program length and series duration, it was decided to limit the number of goals and to focus on those reading skills that appeared to lend themselves to television treatment and would most likely benefit children with reading difficulties. CTW also decided to adopt an eclectic or "cafeteria" approach to teaching rather than

[1] The Use of Television to Supplement the Teaching of Reading: A Proposal, Children's Television Workshop, April, 1971.

to adopt a single method of instruction. In addition, CTW decided to make each half-hour show independent of other shows because of unpredictable patterns of home viewing and because of the inability to match shows with reading instruction. Thus previous viewing would not be required for an understanding of a particular show.

In order to describe the actual output of the show that was an integral part of the treatment in both the in-school and at-home viewing conditions, an analysis of the content of The Electric Company was conducted by ETS staff.[1] This analysis was done in terms of the goals set for the show. The goal being taught and the technique of presentation was recorded every 30 seconds for the 130 half hour shows. This resulted in 7,124 separate recordings of goal and treatment -- about 59 hours of programming time which excluded the two or three minutes of each half hour spent on introductions and credits.

Table 2 indicates the number of times and the percentage of time each goal area was observed during the 130 programs. The great majority of time was spent in three goal areas which accounted for over 70 percent of the show -- symbol/sound analysis, processing letter groups, and reading for meaning. Entertainment, when no goal area was being directly addressed, accounted for about 16 percent of the show. Table 3 takes those goals that were treated more than one percent of the time and indicates the techniques used to present each goal. The primary technique

[1] Section D. 8 contains a more detailed description of the content analysis procedure.

used to teach every goal was people, and the second most used technique to teach almost every goal was animation (i.e., cartoons). In general, there was very little difference in the approach to each goal. Table 4 presents the techniques employed more than one percent of the time and indicates the goals taught by each technique. Three techniques accounted for over 85 percent of the time and these were people, animation, and song.

Overall, the content analysis indicates that a wide variety of goals was observed being taught but that the techniques of presentation were relatively few and were similar from goal to goal. The content analysis becomes more useful when we present the results of the study and begin to relate the achievement levels of children to the content they received via The Electric Company.

D. Measuring Instruments

1. General Considerations

The evaluation of The Electric Company necessitated the selection, adaptation, and development of a large number of measuring instruments. The focus of the evaluation was the child and his or her reading ability, but the child was not alone nor could the child be considered as operating in isolation. Indeed, the child was part of a class and was interacting with that class and its teacher; and the child was part of a family and a home environment where, in two of the sites, the experimental treatment was to occur.

Because we were interested in finding out about the context in which the treatment took place, we needed a variety of measuring instruments. These included pretests and posttests of the child to assess reading achievement, questionnaires for the parents to obtain background information about the children's homes and families, questionnaires for the classroom teachers to obtain biographical and attitudinal information, observational records of the classroom reading lessons to assess the kinds and amounts of reading instruction in the classes, viewing records from the children to estimate the amount The Electric Company was being viewed, and a content analysis of the show to classify the kind and amount of instruction being televised. These measures focused on the primary objectives of the show (intended outcomes) but also included other areas likely to be affected

by the show (side effects and transfer effects) as well as areas likely to influence the show's effects (moderator variables).

2. Tests for Children

The research design of the evaluation of The Electric Company called for testing 400 classrooms. The testing of the children had to be accomplished quickly, given the short period of time between the opening of school in early September and the beginning of the show in late October. The testing had to encompass a wide range of reading achievement behaviors focussing on the intended outcomes of the show but also including possible side effects and moderator variables.

All but one of the measures administered to the children were developed by us specifically for the evaluation. Although there are many reading tests available, none of them fit the primary purpose of assessing the specific goal behaviors of the show. The development of The Electric Battery (as these tests were called) was done in cooperation with CTW. ETS staff met with CTW research and production staff to ensure that the battery was measuring the goal behaviors as intended by CTW. In addition, two experts in the areas of reading, measurement of reading, and psycho-linguistics were consulted. These included Dr. John B. Carroll of ETS, Professors Walter H. MacGinitie of Teachers College, Columbia University, Helen Popp and Douglas Porter of Harvard University. The battery was pilot tested on classes of first through fourth grade children in summer schools being held in the New Jersey area and was revised on the basis of these inputs.

All of this development, consultation, pilot testing, and revision occurred in a two month period, since tests had to be printed in August and shipped in September for administration beginning the end of September. Therefore, the pretesting of the children in the evaluation itself became a kind of pilot test of the battery on a large scale. The entire battery was subjected to an intensive study after the pretesting so that any defective items or subtests could be dropped and the tests rescored. Although several items were spotted that could have been improved had time allowed, none was found to be so defective as to need elimination.

The Electric Battery included tests intended for group administration, a short test given to some children in each class on an individual basis, and one section of the Metropolitan Achievement Test appropriate for each grade level. (See Appendix B for a description and a copy of the battery.)

a. The Electric Battery Group Tests.

Although the evaluation required testing classes in grades one through four, a single battery was developed. This was in part due to the short amount of time available for test construction, but also because the goals of the show were the same for all grades and our primary objective was to assess the effects of the show in these goal areas in each grade. (Appendix A is a detailed listing of the show's goals.)

The children in all grades were tested in groups by a tester employed and trained by ETS staff. Each tester was helped by a tester-aide, also employed by ETS, and by the classroom teacher who was requested to stay in the room during the testing. Since all classes were group tested, it was felt that three adults were needed in each class to maintain control in the class and to aid individual children who might encounter difficulty in following directions. The decision to use group tests was made because of the large number of children to be tested. Of equal importance, the group testing technique did not require a student to pronounce words which might cause dialect and accent to affect the tester's scoring of reading performance.

The group testing made it necessary to design the battery and the test booklets so that children with limited reading ability could be validly tested. All tests were put in a single booklet, and each page of the booklet was a different color so that the child could easily follow tester directions (e.g., to turn to the blue page), and so the tester, aide, and teacher could quickly spot any child who had turned to the wrong page. The Electric Battery was created around one basic format where the child selected one of four options (in the measures of reading ability) or one of two options (in the measures of attitude). By maintaining a simple set of rules we hoped to reduce confusion among the children. Presumably, too, it insured that

the child's wrong response was not often due to an inability to understand the testing format. For every item, children were required to make an X directly in the test booklets for the options of their choice. In a large percentage of items, choices were among pictures where only the stimulus had to be read so that a child's limited reading ability did not discourage him from continuing. In every case where a picture was presented as a stimulus or option, the tester named the picture so that children had both verbal and visual clues. Before each class was tested, a short pilot test of six items was given to allow children practice in answering the kinds of questions in the actual battery. In addition, each subtest was introduced by one or two sample items. On any one page in the booklet, a maximum of six items appeared so that pages were uncrowded and easy to follow from item to item.

The group test was designed with the tester as well as the children in mind. The different colored pages of the test booklets were matched by the colored pages of the test directions book. Each tester also used an enlargement of the Electric Battery while administering the tests to demonstrate the page and the item at which the child should be looking.

There was no time limit imposed on any item or subtest in the battery. Rather, testers were instructed to go as

slowly as necessary so that all children would have time to answer each question. In cases where a child did not seem to understand the group instruction or was unable to keep up with the group, he or she was tested individually or in a smaller group with the same battery but with more intensive supervision. The total testing time varied considerably from grade to grade and from class to class within grade, but in general two testing sessions of 30 to 45 minutes each were required to complete The Electric Battery group test. In the first grade classes, a shortened version of the battery was given at pretest. It was felt that since most first graders were nonreaders, the full battery would be inappropriate.

The Electric Battery contained 123 items which were categorized to obtain 19 subtests assessing specific goals of the show. The subtests can be combined to make four total test scores that reflect the four major goal areas of the show -- namely blending of letter sounds, chunking of groups of letters, scanning for structure, and reading for meaning.[1] And the tests can then be combined into a grand total that includes all the 123 items in the Electric Battery.

b. The Electric Battery Individual Test

In additon to the group-administered battery, some children were tested individually to assess some goals that

[1] See Appendix A for a fuller description of each area.

required verbalization of responses and to repeat some of the group assessments by measuring the child's ability to produce certain groups of letters and words. Because of the large number of children in the study, individual testing was limited to a random sample of 20 percent of the children in each class. In the first grade, children were individually tested at posttest only.

The individual test consisted of 42 items and took about five minutes to administer. It required the child to read aloud nine words, twelve nonsense words, and two sentences and to unscramble four sentences whose words were presented in mixed order. The individual test was administered by both the tester and tester-aide.

c. Metropolitan Achievement Tests

In order to describe the groups of children in the study and to identify those children identified as "target" by CTW, one test of the Metropolitan Achievement Tests, Harcourt Brace Jovanovich, Inc., 1970 Edition, was administered after The Electric Battery administration. The particular MAT battery varied according to the grade level as follows:

Grade 1: Pretest -- Primer, Part 1 Listening for Sounds. This test is described in the MAT Teacher's Directions Manual as a 39-item test that measures "pupils' knowledge of beginning and ending sounds and sound-letter relationships."

Posttest -- Primary I, Part 1 Word Knowledge. Described as a 35-item test that measures "extent of pupils' reading vocabulary."

Grade 2: Pretest -- Primary I, Part 1 Word Knowledge.
Posttest -- Primary II, Part 1 Word Knowledge. Described as a 40-item test that measures "extent of a pupils' reading vocabulary....Twenty-three items require pupil to identify a synonym, antonym, or classification for a given word."

Grades 3 and 4: Pretest -- Primary II, Part 1 Word Knowledge.
Posttest -- Elementary Battery, Part 1, Word Knowledge.
Described as a 50-item test that measures "extent of pupils' reading vocabulary....requires pupils to identify synonyms, antonyms, or word classification....Items range from primary level to junior high level in difficulty."

The Metropolitan Achievement Tests were chosen from the many reading achievement tests available for several reasons. Of primary importance was the fact that the test is one of the most widely used in schools across the country and we hoped to be able to describe our sample in terms that were generalizable to many school situations. Second, the norms given for the tests discriminate well among children who

score in the lower half and lowest quarter, a feature not common to many other standardized tests. The sample of pupils tested to obtain norms for the MAT was selected to provide norms that reflected national levels of achievement, and the tests were standardized as recently as April, 1970. And unlike some other normed tests, where a chance score may be equivalent to a percentile rank that sometimes exceeds 25, the MAT provides norms that allow poor readers to be distinguished from non-readers who could only perform at chance level. Permission to reprint the appropriate sections of the MAT for inclusion in the Electric Battery was granted by Harcourt Brace Jovanovich, Inc. This made unnecessary the cumbersome handling and coding of two separate booklets per child.

Tables 5, 6, and 7 list the tests and subtests administered in the pretest and posttest and the reliabilities obtained.[1] The reliabilities are reported separately for each of the groups of major concern in the evaluation. In Fresno and Youngstown the reliabilities of the class scores for grades one through four at pretest and at posttest are reported along with the reliabilities of the respective gain scores. For Richmond and Washington the reliabilities of individual scores as well as class scores are presented since both scores are used in the analyses of the data in

[1]The reliabilities were calculated using Kuder-Richardson Formula 20.

these two sites. The reliabilities of class scores on the grand total (123 items) and the smaller test totals (blending, chunking, scanning, and reading for meaning) are consistently high and fall below .90 only in the case of some gain scores on the smaller test totals. Among the subscores, which vary in length from four items to 13 items, the reliabilities are somewhat lower and tend to be lowest in subscores with the fewest number of items. The reliabilities of class pretest, posttest, and gain scores are expectedly somewhat higher than those of individual scores.

Tables 8 through 11 present the intercorrelations of pretest scores and posttest scores on the test totals and attitude scales of The Electric Battery, the Metropolitan subtests, and in Richmond and Washington, the two viewing indices, within each grade and each site. These intercorrelations are based on class scores and not individual scores and this is consonant with other presentations in this evaluation. That is, the important analyses to be presented in this report are based on class averages rather than individual scores. A number of intercorrelations found in Tables 8 through 11 reveal properties of the tests and of the constructs that the tests assess.

The intercorrelations of the test totals and the grand total of the Electric Battery are usually very high (in the 90's). A factor analysis confirmed that one factor accounted

for much of the variance among the tests. The matching total had the lowest set of correlations with the other test totals and this seems to be reasonable since the matching test called upon skills least related to the other tests. Nonetheless, in first grade, the matching scores of classes was moderately related to the blending, chunking, scanning, and reading for meaning scores (in the 60's and 70's).

A high correlation was obtained between the grand total scores of classes on the Electric Battery and their scores on the respective Metropolitan reading achievement test -- in all sites but Washington these correlations were in the 80's and 90's.

The correlations between the two attitude measures were generally low. The two attitude areas being assessed -- school and reading -- are by no means identical. That is, one could enjoy school but not prefer reading to other school subjects. Similarly, one could prefer reading to the other school subjects and not enjoy school. Thus, the low correlations are less a matter of concern and more a warning that the attitudinal area is one requiring a multi-assessment approach. Attitude to school correlates moderately (usually in the 20's to 40's) with performance on the Electric Battery but the degree of preference for reading as a school subject does not seem to be correlated with reading performance.

In each of the tables, the correlations lend credibility to the tests themselves in that tests that are conceptually related are empirically related.

3. Parent Questionnaires

Once in the fall before the show began and again in the spring following the show, questionnaires were distributed to parents of all children. Parents were requested, through the teacher, to complete the questionnaires. Given the large number of children involved, it was not economically feasible to offer money for completing the questionnaire as we had done in the Sesame Street evaluations.

The parent questionnaires provide much information about the children, their homes, and their television viewing habits, including socioeconomic indices, parental level of aspiration for the child, child and parent affluence indices, parental attitudes to education and to reading, parental and child reading habits at home, and TV viewing habits of the child. At the second administration, a section was added to the questionnaire for Washington and Richmond to find out from the parents how often children watched The Electric Company and under what conditions the viewing occurred. This was not necessary in Fresno and Youngstown as the show was not televised during after-school hours in these sites. A copy of the pretest and posttest Parent Questionnaires is presented as Appendices C and D.

In addition to the item responses, six indices were developed from responses to certain groupings of items in the Parent Questionnaires. These were:

Child Affluence Index, obtained by adding the yes responses in item 8. It is based on the children's personal possessions in the homes.

Parent Affluence Index, obtained by adding the yes responses in item 10. It is based on responses elicited to assess the material affluence of the children's homes.

Years of Parents' Education Index, obtained by averaging the number of years of formal education of the children's mother (item 11) and father (item 13). When only one of these items was completed, the single response was used as the index. This index serves as one measure of socioeconomic status.

Number of Siblings Index, obtained from item 6.

School Expectation Index, computed separately for pretest and posttest items 17-23, and obtained by adding the weighted responses. It is based on how successful the parents think their children are in school as compared with most other children.

Child Reading Index, computed separately for pretest and posttest items 24 and 26, and obtained by averaging the weighted responses. It attempts to measure the frequency with which the children are read to or read themselves at home.

4. Teacher Questionnaires

Questionnaires were distributed to all teachers in the study once in the fall and again in the spring. Appendices E and F present the pretest and posttest Teacher Questionnaires. The questionnaires were developed by ETS in order to obtain teacher background information (including educational and teaching experience), teachers' attitudes toward such things as educational television, various approaches to teaching reading, and the show itself. In addition to the item responses, the following scales were developed by combining results from several items:

Attitude toward Educational TV Index, obtained by averaging the weighted responses to pretest items 25a and 25b and 26a and 26b and posttest items 15a and 15b and 16a and 16b. It attempts to measure the teacher's attitudes toward educational television when used both at home and at school.

Attitude toward Phonics Index, obtained by averaging the weighted responses to pretest items 25c and 26c and posttest items 15c and 16c. It attempts to measure the teachers' attitudes toward the phonic approach to teaching reading.

Attitude toward Linguistics Index, obtained by averaging the weighted responses to pretest items 25d and 26d and posttest items 15d and 16d. It attempts to measure the teachers' attitudes toward linguistic approaches to teaching reading.

Attitude toward Sesame Street Index, obtained by the weighted responses to pretest item 27. It attempts to measure the extent

to which the teacher perceives Sesame Street as a useful tool for helping preschool children.

Attitude toward Reading Performance Index, obtained by averaging the weighted responses to pretest items 29, 30, and 31 and posttest items 17, 18, and 19. It attempts to measure the attitude of teachers toward the reading performance and potential capability of their children.

The teacher questionnaire was also the main source for estimates as to the amount of time spent on reading. While classroom observations would have been a more objective and realistic method by which to obtain such estimates, the number of classrooms (400) and the length of each observation (six hours) precluded placing heavy reliance on this. At posttest, the teacher questionnaire was expanded to include items measuring the experimental teachers' attitudes toward The Electric Company.

5. Observations of the Classrooms

A description of the reading program used in each experimental classroom was obtained by the observation of classroom reading instruction by the ETS coordinators. Such observations were used to see if teacher behavior affected the impact of The Electric Company on that class. The observational technique was used in recognition of the fact that the reading approach teachers say they use on a questionnaire or that teachers are directed to use by administrators may differ from the approach actually used in the classroom.

In each site, the coordinator observed each experimental classroom once a month from November through April. Each of the six observations lasted 25 minutes, so that the reading instruction in each experimental classroom was observed for two and a half hours spread evenly over a six month period. While more frequent observations would have been desirable, and observations of control classrooms would have provided normative data, funds were not available for collecting these data.

During each observation period, the ETS coordinator categorized both the content of the instruction (primarily in terms of the goals of The Electric Company) and the teaching technique used (primarily in terms of the interactions between teacher and children). The categorizations were in terms of duration, where the observer noted the number of minutes spent on each content area and the number of minutes spent using each teaching technique. Appendix G provides a copy of the observation form used.

In the analyses of the observations, the reading areas were considered separately as they closely paralleled the goals of the show. However, teaching methods were combined into the following groups:

Child-centered Instruction -- includes activities where children worked by themselves; silent reading, writing, workbooks, working individually or in groups.

Teacher-centered Instruction -- includes activities where the teacher was the focus of the classroom instruction -- reading aloud, writing, talking to children.

Child-teacher Interaction -- includes activities where the children and teacher interacted; children reading aloud, children writing in front of class, and teacher and children discussing.

Use of audio-visual materials and nonreading time were kept separate from the other methods.

6. Attendance Records

One of the many possible side effects of viewing The Electric Company could be a change in the attitude of viewers toward school. One measure of a children's attitudes toward school is their attendance records. Since The Electric Company was actually a part of school in Fresno and Youngstown, the attendance of children might likely be affected either positively or negatively if the show were providing a strong source of affect for children.

For these reasons periodic attendance records of each class in the study were collected from school records by the ETS coordinators. The attendance records were collected monthly, every six weeks, or bi-monthly depending on each school system's normal procedure. A comparison of the experimental and control classes' attendance records may tell us something about the effects of The Electric Company on children's attitudes toward school. However, one must always bear in mind that this index probably contains a large proportion of error variance produced by such extraneous factors as attitudes of parents who, for children of this age, have the most control over the school attendance of their children.

7. Viewing Records

It was extremely important to measure the amount of Electric Company viewing of each classroom in Fresno and Youngstown and of each child in Richmond and Washington. The need was particularly great in the two sites where teachers encouraged children to view The Electric Company at home, since encouragement is no guarantee of viewing and lack of encouragement is no guarantee of not viewing. One of the greatest problems in our evaluations of Sesame Street, and again in this part of our Electric Company study, was the establishment and maintenance of two groups of children who differed in the amount of at-home viewing. Assuming that some encouraged children would not view and some not-encouraged children would view, it was essential to assess the amount each child actually viewed.

Without the great sums of money and highly sophisticated techniques available to such well-known organizations as Nielsen, the ETS approach was necessarily one of self-report. This technique has its obvious drawbacks, only one of which is the unmeasured influence of social desirability of certain responses. However, this study required measurement of differences between large groups (i.e., classes of children) rather than differences among individual children, and the viewing measures are used as indicators of differences in viewing among groups rather than exact descriptions of amount of viewing.

Three different measures of viewing were used in the evaluation. In the two in-school viewing sites, teachers were asked

to indicate the amount of viewing in their classes once in January and again in May. Since children in these sites could not view the show at home, teachers were the only source of information needed. (See Appendix H.)

In the two at-home viewing sites, children themselves and their parents were asked about their viewing. The children's viewing records consisted of pictures representing twelve different television shows. (See Appendix H.) Teachers asked their children to make an X on a picture if they had seen the show in the last week and to leave the picture blank if they had not seen the show. The Electric Company was one of the pictured shows but was embedded in eleven others so as not to draw specific attention to it. These viewing records were supposed to be collected four times from each classroom (once a month from January to April) but, due to many factors, were actually collected from one to four times in each classroom.

The parents in the at-home sites were asked about the frequency of their children's viewing on the posttest parent questionnaire. (See Appendix D.) A score was derived by adding the weighted responses to the following three questions:

42. Does your child ever watch the TV show The Electric Company?
43. About how many times a week does your child watch The Electric Company?
44. About how much of each Electric Company show does your child usually watch?

The use made of these viewing scores varies according to the particular analysis conducted.

8. Content Analysis

A detailed analysis of The Electric Company as it was broadcast was conducted by ETS staff in order to describe the educational program being evaluated. The results of this analysis have been presented earlier. Once every thirty seconds of each show, a notation was made as to the specific goal being taught and the specific television technique being used to teach the goal. In this way, the amount of time devoted to each goal and to various production techniques over the 130 hours of telecasting time can be described. (See Section C3 above.) The content analysis data were then related to the test data on amount of learning. Although none of the observed relationships can be considered causal, they provide some insight for future production and research. A copy of the actual schema used in the content analysis appears as Appendix I.

CHAPTER III. RESULTS

A. The Questions to be Asked

The previous two chapters have indicated the nature of The Electric Company, how ETS became involved in its evaluation, and the research design, sampling plan, and measuring instruments that were used in the evaluation. Before proceeding with the presentation of the results, it is appropriate to present in summary form the questions that were addressed in the evaluation. These questions will be addressed again in Chapter IV when conclusions are presented.

1. What are the effects of viewing The Electric Company in school on first to fourth grade classes? What are the effects of viewing in school on second grade children who score in the lower half of their grade on normed reading achievement tests? What are the effects of viewing in school on third and fourth grade children who score in the bottom quartile on normed reading achievement tests?

2. What are the effects of viewing The Electric Company in school on first to fourth grade children from Spanish-background, on black children, and on white children? What are the effects on first to fourth grade boys and girls?

3. Are there any differential effects from viewing The Electric Company in school on color TV sets versus on black and white TV sets?

4. What are the effects of viewing The Electric Company at home on first to fourth grade classes? What are the effects of viewing at home on second grade children who score in the lower half of their grade on normed reading achievement tests? What are the

effects of viewing at home on third and fourth grade children who score in the bottom quartile on normed reading achievement tests?

5. Does frequency of viewing affect the show's impact on children viewing at home?

6. Does The Electric Company affect the attitudes of children toward reading or toward school?

7. Does The Electric Company affect attitudes of teachers or parents toward the children and their reading performance? What are the attitudes of teachers toward the show?

The following sections of this chapter will describe the sample in some detail and will then present the results of the evaluation. The final chapter will return to the questions presented here and answers, based on the results, will be given.

B. Description of the Sample

1. The Sites

The following description of the sites is presented to provide a background to the study. The descriptions are merely impressionistic and do not constitute substantive data of importance to the sampling or research design.

Fresno County, California has a population of 413,000 (1970 census) and an area of almost 6,000 square miles. Its county seat is the city of Fresno with a population of 166,000. The city is relatively modern, yet it is situated in the heart of the San Joaquin Valley, surrounded by irrigated lands of considerable fertility. Principal products of the county include grains and fruits (especially melons, grapes, and oranges). The main manufacturing industry is drying and packing of fruits, but machine shops, foundries, potteries, brickworks, and soap factories are also represented. Fresno County has 37 independent elementary school districts including the city of Fresno, and the evaluation of The Electric Company involved nine of them. The schools in the sample range from inner-city schools to relatively remote rural schools.

Youngstown, Ohio is about equidistant (65 miles) from Cleveland, Ohio and Pittsburgh, Pennsylvania. Its greatest growth occurred between 1900 and 1920, at which point over a quarter of the population was foreign-born whites. Youngstown

is the center of fine agricultural country but its chief product is iron and steel. Both coal and limestone are available from nearby mines and by 1950 it was the third largest producer of iron and steel in the United States. Over the past two decades, the city of Youngstown has shown signs of decay. The population in 1960 was 166,700 but ten years later it had dropped to 141,000. The center of the city provides an indication of the problems of Youngstown, where old buildings and unrebuilt lots are common.

Richmond, the capital and largest city in Virginia, was the capital city of the Confederate States from 1861 to 1865. The city in 1970 had a population of 249,400, an increase of over 30,000 from 1960. The city is attractively laid out around a bend in the James River, has many parks, and is rich in educational institutions. Over recent years the city's schools have had an increasingly black constituency as white families have moved to the suburbs. A court order to use busses to integrate city with suburban school districts is currently being hotly argued.

Washington, D.C., as the nation's capital city, is well-known and therefore needs little introduction. Its current population is 756,500, down slightly from 1960. Its public school population is now about 95 percent black so that de facto segregation is the rule. The school system has undergone a number of stormy leadership changes over the past few years. While Washington, D.C. and its school system are unique in many ways, nonetheless they have many problems similar to other large urban centers and their associated school systems.

2. The Sample

Within each site we sought schools where there was a preponderance of target children at each grade level. This took us into schools serving a population characterized by disproportionate numbers of low income and minority group families. In Youngstown, however, in order to obtain the required 40 classes at the second grade level, it was necessary to use virtually all the available schools. Thus, as we shall see, the Youngstown second grade group includes a somewhat higher proportion of children with a middle class background than in other sites or other grades.

The sample to be described in the following pages refers to those sampled children in each site for whom complete pretest and posttest data were obtained. Table 12 presents the descriptive categorization of the sample by frequency and by percentage. It may be seen that the expectations were met in most categories. There are slightly more males than females in the sample in each site, reflecting, of course, the population characteristics. The population and language groupings vary greatly among the sites and this was part of the design. Thus, the percentage of black children varies from eight percent in Fresno to 97.8 percent in Washington. Similarly, the percentage of the sample who has a Spanish background ranges from about zero in Washington and Richmond to 50.9 percent in Fresno.

All children in the sample are English speaking to some degree because the testing was carried out in English, and any

children who did not understand the directions for the test were dropped from consideration. However, it is clear that a large number of bilingual children was sampled, especially in Fresno where 44.4 percent of the sampled children are bilingual. The sampling was based upon classes which were paired with one becoming experimental and the other control. When problems occurred such that a class had to be dropped from the sample, its pair was also dropped. Thus, the number of control and experimental classrooms in the sample is the same, so it is also not surprising that the proportion of children in the experimental-control category varied only within the 51-49 percent range. Although the sampled children came only from grades one through four, their ages range from five- to 12-years-old.

The expectation was that, in each site, there would be 500 first graders in 20 classes, 1,000 second graders in 40 classes (800 of whom were to be target), 500 third graders in 20 classes (including 300 target), and 500 fourth graders in 20 classes (including 300 target). (See Table 1.) The obtained numbers of classes, of children, and of target children were somewhat less than expected except in Youngstown first grade and in the fourth grades of Fresno, Richmond, and Washington. One of the major reasons for obtaining a slightly smaller sample than intended was that classes had to be dropped in some sites. In Fresno six pairs of second grade classes were lost when it was found that the assignment of these classes to the experimental

and control conditions was not random. In Richmond one pair of classes was lost in third grade when one class from that pair was dissolved during the year and its pupils dispersed among other classes. In Washington, two first grade pairs, four second grade pairs, and one third grade pair were lost when the treatment broke down in two schools. In those schools some teachers chose not to continue to cooperate and began showing The Electric Company in school. In all cases when one member of a pair of classes was dropped from consideration its matchee was also dropped, and all children in both members of the pair were excluded from the sample.

As well as the forced dropping of classes from the sample, there was also attrition due to the normal moving of some children to other schools during the course of the evaluation and the absences of some sampled children from school during the testing periods. It is, of course, proper to enquire whether the forced dropping of classes and the normal attrition of children from sampled classes had a major impact on the nature of the sample studied in the evaluation. This does not seem to have occurred. Of the 10,248 children pretested in 404 classes, 8,363 were posttested in 376 classes. In Richmond somewhat more girls than boys were lost from the study (48.05 percent at pretest were girls but 47.7 percent were in the final sample). In Washington, the reverse was true. Here boys constituted 52.1 percent at pretest but 50.9 percent of the final sample. In other categories

similarly small changes occurred (for example, in Fresno the proportion of Spanish background children at pretest was 49.7 percent and in the final sample was 50.9 percent). The integrity of the evaluation does not seem to have been disturbed through attrition, forced or voluntary.

C. Analyses of the In-school Viewing Experiments

1. An Overview

The results presented in this section of the report concern the two sites of Fresno County, California and Youngstown, Ohio. In both sites, pairs of classrooms in grades one through four were chosen and one member of each pair was randomly assigned to view The Electric Company in school. The numbers of classes and of children involved in each site and some demographic information have been presented in the preceding section of this chapter (see Table 12).

Table 13 indicates the results of the random allocation to treatments procedure and presents a break out of the demographic data by experimental (viewing) and control (non-viewing) treatments within each site. The population group characteristics in Fresno seem very similar for both viewing and nonviewing groups. In Youngstown, a slightly higher percentage of blacks was in the viewing group (50.3 percent) than in the nonviewing group (47.8 percent). Similar kinds of small differences in composition between the viewing group and the non-viewing group (usually about one to two percent) occur with respect to language background, age, sex, and target group membership. None of these differences was deemed to be serious. Rather they were thought of as normal variations to be expected between randomly assigned groups.

It should be remembered that the pairings of classes did not involve any manipulation of the memberships of those classes.

Thus, although the pairs were always within the same school and the same grade, the classes were not identical in composition. In Fresno and Youngstown, schools tended to be small so that in most schools there were only two or three classes available at any one grade level. The pairing, therefore, was carried out at a relatively gross level, and comparability of groups rested heavily on the subsequent randomization of pair members to treatment conditions. In short, some minor differences between experimental and control groups could be expected to and did occur.

The in-school viewing evaluation is regarded as having been carried out in separate experiments in two sites and in four grades in each of those sites. The decision to regard the in-school viewing study as eight separate experiments was based on both logical and empirical grounds. On logical grounds it made little sense to combine scores across grades since the target population varied from grade to grade and the questions to be asked about the effects of the show varied too. For example, in first grade the concern was whether the show helped children as they initially learned to read while in fourth grade the major question was whether the show helped poor readers. It also made little sense to combine results across sites because the sites were chosen for their special, different characteristics -- for example, the Fresno sample had about 50 percent Spanish-background children and the Youngstown sample had about 50 percent black children. The decision to keep grades separate was fairly

obvious when results were seen to differ by grade. Furthermore, the intention was to use the pretest score as covariate. A priori, there should be different relationships between pretest and post-test scores across grades due to ceiling effects in the upper grades.

The decision to keep the two sites separate was reinforced when an analysis of variance was conducted using the mean grand total Electric Battery scores of second grade pairs of classes. Sites, treatment, and pairing were the independent variables. A summary of the analysis is here presented.

Effect	df	Mean square
Site	1	116
Pairs within site	32	1088
Treatment	1	7356
Treatment x Site	1	1416
Treatment x Pairs	32	271
Subjects within Classes	1516	88

Note that treatment effect is highly significant. Of more concern at this point is a significant treatment by site interaction indicating a need to keep the sites separate if a proper understanding of the effects of the treatment were to be obtained. Note finally that the relatively large pairs within site effect indicates, as one might expect, that the pairs of classes did differ; the relatively small treatment by pairs interaction and subjects within classes effect indicates a consistent treatment effect across pairs of classes and homogeneity within classes; the smaller subjects within classes effect indicates the classes must be retained as the unit of analysis.

The evaluation of the in-school viewing condition is therefore treated as an evaluation of eight separate experiments involving four grades in two different sites. An overview of the results of the eight in-school experiments is here presented as Abstract I.[1] The results are based on data from the Electric Battery reading achievement test of 123 items (except pretest first grade where there are 24 items). The mean pretest, post-test, and gain scores for the viewing classes and for the non-viewing classes are presented separately by grade and by site. Further, Abstract I presents the mean difference between the gain scores of the viewing and non-viewing classes as well as appropriate standard errors of the estimates. Finally, each mean difference score is converted to an adjusted mean difference score by covarying the pretest scores of these classes; and the standard error of the estimate of the adjusted mean difference score is also presented. Note, again, that if the reader wishes to have a more comprehensive view of the results, continued reading of the report is essential. This section is intended only as an overview.[2]

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[1] All Abstracts are presented within the text of Volume 1 of the report, unlike the Tables which all appear in Volume 2.

[2] We realize that the reader would need, for example, standard deviations of scores in order to interpret and compare the mean scores properly. These are provided in the relevant tables in Volume 2. We have chosen to provide only a skeletal outline in this and similar summaries which concentrate on mean scores and present only the more crucial measures of dispersion. The standard deviation is derivable from the standard error $\sqrt{N}$ S.E. = S.D.

Abstract I

The In-school Viewing Experiment: An Overview

	Fresno				Youngstown			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=11 pairs			Grade 1*	N=10 pairs			
Viewing	15.2	73.9	58.7		15.9	80.6	64.7	
Non-viewing	16.1	71.2	55.1		15.1	66.1	51.0	
Viewing minus Non-viewing	-0.9	2.7	3.6	5.6	0.8	14.5	13.7	10.2
SE of Estimate	1.6	2.7	2.4	2.5	0.6	3.6	3.0	1.8
	N=14 pairs			Grade 2	N=20 pairs			
Viewing	70.5	99.2	28.7		79.7	103.2	23.5	
Non-viewing	65.0	88.2	23.2		74.7	96.7	22.0	
Viewing minus Non-viewing	5.5	11.0	5.5	5.8	5.0	6.5	1.5	2.2
SE of Estimate	2.8	3.1	1.7	2.0	2.8	2.6	0.9	0.9
	N=10 pairs			Grade 3	N=10 pairs			
Viewing	89.5	104.3	14.8		96.7	108.7	12.0	
Non-viewing	93.8	105.1	11.4		97.9	107.2	9.3	
Viewing minus Non-viewing	-4.3	-0.9	3.4	2.4	-1.2	1.6	2.7	2.4
SE of Estimate	3.0	2.6	1.1	1.0	2.6	2.0	1.1	0.9
	N=11 pairs			Grade 4	N=10 pairs			
Viewing	105.3	113.1	7.8		109.6	115.2	5.5	
Non-viewing	99.3	107.0	7.7		109.6	113.9	4.3	
Viewing minus Non-viewing	5.9	6.0	0.1	1.1	0.0	1.2	1.2	1.2
SE of Estimate	3.1	2.5	0.7	0.6	1.6	1.0	0.8	0.4

*24-item pretest

From Abstract I it can be seen that the pretest reading scores of the viewing and non-viewing groups are generally not very far apart. In Fresno the differences between the groups' mean pretest scores range from 0.9 in first grade to 5.9 in fourth grade. In two of the grades (first and third) the difference is in favor of the non-viewers while in the other two grades the reverse is true. In Youngstown the picture is quite similar, with differences at pretest ranging from zero to 5.0. In first and second grades the viewers performed slightly better at pretest, in third grade the non-viewers performed slightly better, and in fourth grade there was virtually no difference. In none of the eight pretest comparisons (two sites-four grades) was the difference in reading achievement between the viewing and non-viewing groups statistically significant (p .05).[1] This further indicates that the random allocation of classes to conditions had the desired effect of obtaining comparable treatment groups.

Abstract I also presents the mean posttest scores and mean gain scores of the viewing and non-viewing classes separately by grade and by site. The mean differences (viewing minus non-

[1]The statistic used to determine significance was the test on the ratio of the difference score to its standard error. Two-tailed tests were used to determine significance levels of pretest differences. In subsequent analyses, one-tailed tests are applied to test the hypothesis that the experimental treatment benefited the viewing classes. Although the two-tailed test produced no significant pretest differences at the .05 level, three of the eight comparisons produced significant differences at the .10 level. The divergency of pretest scores is somewhat greater than one would expect by chance, but only two of the three significant (.10) differences favored the experimental classes. When classes are broken up into their target and non-target components, differences with high probabilities occur less frequently.

viewing) between the posttest and gain scores are also presented along with their standard errors. It can be seen that in seven out of the eight experiments, the viewing classes have a higher mean posttest score than the comparable non-viewing classes (the exception being in Fresno third grade).

When the gains from pretest to posttest are examined, it can be seen that in all eight experiments the viewing classes gain more than the non-viewing classes. The standard errors of the estimate of these differences are also presented in order to allow interpretion of the statistical significance of these differences.

Since the viewing and non-viewing classes were slightly different at pretest and since it is reasonable to assume that pretest performance is related to posttest performance and to gains, the summary overview also presents adjusted mean difference scores, i.e., a covariance adjusted score in which the regression of the posttest scores on the pretest scores is taken into account. It can be seen that in most cases the adjusted difference score (viewing minus non-viewing) provides a picture quite similar to that of the gain score and the posttest score.

Thus, as we have seen, there are three estimates that could be used to estimate the effect of the treatment -- posttest scores, gain scores, and gain scores with pretest covaried. In the subsequent analyses, the covariance technique was deemed the most precise estimate. In the majority of cases the standard error of this adjusted score is smaller than the standard error

of either the gain score or the posttest score. Hence, in the interest of uniformity, all subsequent statistical tests on these data will use the adjusted scores (gains with pretest covaried, which is the equivalent of posttest scores with pretest covaried).

The central issue to be addressed from this overview of the data is what indications it gives with respect to the effects of the show. The ratios of the mean adjusted gain scores (viewing minus non-viewing classes) to the respective standard errors indicate from the "t" distribution that the viewing of The Electric Company had a statistically significant positive effect ($p < .05$) on the grand total scores of the classes in all eight experiments (grades one through four in both Fresno and Youngstown). The effect is largest in the first grade, and becomes smaller in the higher grades.

Before moving onto a more detailed grade by grade presentation, a second general overview is presented. It will be recalled that certain target groups are of primary interest to this evaluation. In first grade all children are categorized as target children; in second grade those in the bottom half on national reading norms are so categorized; and in third and fourth grades the children in the bottom quarter are the target population.

The approach adopted in the sampling plan for this evaluation involved the use of intact classes. Thus, although schools having predominantly poorer readers were initially approached, the second,

third, and fourth grade classes finally obtained and paired usually had a mixture of both target and non-target children. The first overview of the data was based on the scores in each class of all children who had been pretested and posttested. For first grade, by definition, this represents the target audience but in the other grades it represents a mixture of target and non-target children. In second through fourth grades, therefore, a mean score for each class was developed for target children and another for non-target children (the better readers as indicated by their scores on the appropriate Metropolitan reading test). If a class had no children in either the target or non-target category, it and its pair were dropped from consideration for that specific analysis. Note that as the classroom was the unit of sampling, it again has been retained as the unit of analysis. Note too, that class means are not weighted in the analyses by the number of children that make up the class means. In general this is no problem even though some classes had only a few non-target members. These groupings will be called target components and non-target components.

Abstract II presents the same set of information as had been presented in the first abstract, for target and non-target components of classes separately for each grade and site. It may be seen that viewing and non-viewing target components at each grade level had, on the average, quite similar pretest scores, and this was also true for the pretest scores of non-target

Abstract II

The In-school Viewing Experiments: An Overview of Target and Non-target Classes

	Fresno Target				Fresno Non-target			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=14 pairs			Grade 2	N=10 pairs			
Viewing	61.4	93.8	32.4		93.4	114.4	21.1	
Non-viewing	58.3	83.2	24.9		96.5	112.6	16.1	
Viewing minus Non-viewing	3.1	10.6	7.6	7.6	-3.2	1.8	5.0	2.3
SE of Estimate	2.4	3.0	1.9	2.1	2.6	0.9	2.4	1.0
	N=10 pairs			Grade 3	N=8 pairs			
Viewing	79.6	99.0	19.4		107.7	116.3	8.6	
Non-viewing	83.0	97.4	14.4		108.5	114.8	6.3	
Viewing minus Non-viewing	-3.4	0.6	4.0	3.5	-0.8	1.4	2.3	1.6
SE of Estimate	3.0	2.8	1.3	1.5	0.8	0.7	1.0	0.7
	N=11 pairs			Grade 4	N=8 pairs			
Viewing	98.7	109.0	10.6		115.7	119.6	3.9	
Non-viewing	94.3	103.6	9.3		116.0	118.6	2.6	
Viewing minus Non-viewing	4.1	5.4	1.3	2.0	-0.3	1.0	1.3	1.1
SE of Estimate	2.6	2.3	0.9	1.0	0.8	0.6	0.5	0.4
	Youngstown Target				Youngstown Non-target			
	N=20 pairs			Grade 2	N=17 pairs			
Viewing	70.4	98.0	27.6		97.3	113.7	16.5	
Non-viewing	65.3	90.4	25.1		96.5	112.5	15.0	
Viewing minus Non-viewing	5.1	-1.6	2.5	2.4	0.8	1.2	0.4	0.9
SE of Estimate	1.8	2.1	0.9	1.1	2.1	1.0	1.5	0.7
	N=10 pairs			Grade 3	N=10 pairs			
Viewing	84.3	100.6	16.3		107.9	116.3	8.4	
Non-viewing	87.4	100.6	13.2		108.1	114.4	6.3	
Viewing minus Non-viewing	-0.6	0.2	3.0	2.6	-0.3	1.3	2.1	2.0
SE of Estimate	2.0	1.0	1.3	1.6	0.9	0.7	0.8	0.7
	N=10 pairs			Grade 4	N=10 pairs			
Viewing	102.7	110.1	7.4		116.1	119.7	3.6	
Non-viewing	103.3	110.0	6.7		116.4	118.4	2.0	
Viewing minus Non-viewing	-0.6	0.2	0.7	0.4	-0.3	1.3	1.6	1.5
SE of Estimate	0.8	1.0	1.3	0.6	0.9	0.7	0.3	0.2

components.* As an indication that children were, in general, accurately categorized by the Metropolitan Test as target, the means of the target components on the Electric Battery are invariably substantially lower than those of the non-target components.

The gains made by all groups of second graders (viewers, non-viewers, target, non-target, Fresno, and Youngstown) seem to have been quite substantial. In each case, however, viewers gained more than non-viewers. By covarying pretest scores, an adjusted gain score was obtained as had been done for intact class scores.

Viewing had a statistically significant effect ($p < .05$) on total score for target second grade components in both sites, and for target third and fourth grade components in Fresno only. For non-target components, viewing had a statistically significant effect ($p < .05$) on total score for second grade components in Fresno only, for third grade in Youngstown, and for fourth grade components in both sites. Of the 12 target non-target components in second through fourth grade, eight were statistically significant at the .05 level. The pattern of results is not easy to follow if the strict dictates of a $p < .05$ are observed. However, in all cases, viewers outgained non-viewers. In three of the four results that did not produce significant results at the .05 level, significance levels reached .10. These three cases were non-target components in Youngstown second grade and Fresno

*Only one of the 14 comparisons reached significance at the .05 level (two-tailed) and two out of 14 reached significance at the .10 level.

third grade and target components in Youngstown third grade. In only one case (Youngstown target fourth grade) did the results show little or no effect.

The scores of non-target components in third and fourth grades seem to have been influenced by a ceiling effect. With 123 items in the battery and a mean pretest score of say 116 (see fourth grade non-target scores for both sites), clearly no large-scale gain is available. If the tests represent the processes and facts being taught by the show, this would simply mean that there is relatively less to be learned by third and fourth graders who are reading reasonably competently (those in the top three-quarters of their grade norms).

It was shown that, taking classes as a whole, statistically significant results occurred in both sites in all grades. However, when classes are broken into a target component and a non-target component and analyses run separately, there is some reduction in the proportion of significant positive results. This may be due to some loss in power in that class means are based on a smaller number of subjects, and also to real differences that exist in the sites. In the two sites over the four grades, using a target and non-target breakdown, fourteen comparisons can be made between viewing and non-viewing classes. It was seen that in every instance, accounting for pretest, the viewing classes outgained the non-viewing classes. Ten of these proved significant ($p < .05$) and three closely approached this level ($p < .10$). In only one case did the results show little or no effect.

From the viewpoint of CTW (and one shared by others interested in the reading problems of the poorer readers in our schools), the target children's performance with respect to The Electric Company is more important than that of the non-target children. In each grade in Fresno and in first and second grade in Youngstown, target children benefited significantly from the show. However, when a class views The Electric Company the better readers in the class will usually view too. In all components except second grade Youngstown and third grade Fresno, non-target groups benefited significantly.

In the following sections of this chapter each of the grades will be examined one at a time and a comprehensive presentation made in order to see in which goal areas, in which sites, and with which target and non-target groups significant effects seem to be occurring. Whether effects seem to be related to factors assessed in the parent questionnaire, teacher questionnaire, and classroom observations will also be examined.

2. The In-school Viewing Experiment: First grade

In order to obtain a picture of the specific effects of The Electric Company on first grade classes which viewed in school, the following tables will be examined:

--Tables 14a and 14b which present the pretest, posttest, and adjusted difference in the gain scores for viewing and non-viewing first grade classes in Fresno (14a) and Youngstown (14b).

--Table 15 which presents the mean percentage of children in viewing and non-viewing first grade classes answering each item of the Electric Battery correctly at pretest and posttest in Fresno and Youngstown.

--Tables 16a and 16b* which present the pretest and posttest teacher questionnaire scales and selected items for viewing and non-viewing first grade classes in Fresno (16a) and Youngstown (16b).

--Table 17a and 17b* which present the results of the observations of reading lessons in first grade viewing classes in Fresno (17a) and Youngstown (17b).

--Table 18a and 18b* which present the pretest and posttest parent questionnaire scales and selected items for viewing and non-viewing first grade classes in Fresno (18a) and Youngstown (18b).

*Tables 16, 17, and 18 are presented here to provide a full description of first grade classes. However, discussion of these and similar tables for grades 2-4 will be presented in section 6 of this chapter.

The Electric Battery

First grade classes in all sites were given a shortened version of the Electric Battery at pretest because it was thought to be undesirable to give a full reading test to children most of whom would be unable to read. The 24 items that were administered to first graders at pretest involved only the matching items and some simple items on consonants and vowels. All first grade classes at pretest were also given the attitude tests and the Metropolitan Primer, Part 1. No individual tests were administered.

All first grade classes were given the full 123-item Electric Battery at posttest. Tables 14a and 14b present the pretest and posttest scores by tests and subtests. Note there are four total scores (blending, chunking, scanning, and reading for meaning) and from three to eight subtests making up these total scores. Altogether for the achievement part of the battery there were 19 subtests, four test totals, and a matching test that was included both as an easy section to begin the battery and to discern children with basic difficulties in perception.

For each test total and for each subtest a separate analysis was run to test the significance of the difference between the adjusted scores of the viewing classes and the non-viewing classes. Since, in first grade, only a shortened test was administered at pretest, the total score on that 24-item test was used as the covariate for each of the adjusted scores.

One of the problems associated with the use of many separate significance tests is that one might expect to obtain significant results ($p < .05$) five percent of the time by chance. The problem is compounded when the comparisons are based on scores that are intercorrelated. However, as a first step, the difference between the total adjusted score for each grade in each site for viewing and non-viewing classes was tested and each of the eight comparisons was found to be statistically significant. Thus, the multiple comparisons within each of the sets of data involvea search operation in which an attempt is being made to find where the significant goal areas are located after an overall test has established that an overall significant effect is occurring.

The results of the multiple comparisons within the Fresno and Youngstown data for first grade classes show the following pattern (N.S. = not significant; * = significant at .10 level; ** at .05; *** at .01 one-tailed indicating positive effects).

	Fresno (11 pairs)	Youngstown (10 pairs)
MATCHING WORDS	N.S.	*
Consonants	**	***
Vowels	**	**
Consonant Blends	N.S.	***
BLENDING TOTAL	*	***
Vowel Combinations	**	***
Consonant Digraphs	***	***
Controlled Vowels	N.S.	N.S.
Larger Spelling Patterns	**	**
Sight Words	N.S.	***
CHUNKING TOTAL	***	***
Final e	***	**
Double Consonants	N.S.	***
Open Syllables	N.S.	*
SCANNING TOTAL	**	***
Morphemes	N.S.	***
Linear Blending	**	***
Syntactic Units	N.S.	***
Punctuation	*	**
Context	N.S.	***
Context Vocabulary	*	***
Context Sentences	*	***
Sentence Questions	N.S.	***
READING FOR MEANING TOTAL	*	***
GRAND TOTAL	**	***

The pattern above indicates significant positive effects on each test total in both sites. The individual subtests, even when producing effects that were not statistically significant, all produced effects in favor of the viewing classes (with the one exception of the matching subtest in Fresno).

Using Tables 14a and 14b which are, in part, summarized above and Table 15 which presents item level data, we shall now examine the results for each of the tests in turn:[1]

a. Matching Words

This test was not assessing one of the skills taught directly on the show. At pretest in both sites an average score of more than seven items correct was attained on this eight-item test. The posttest mean score was half an item higher and, not surprisingly, the show did not seem to affect the children's ability to match words.

b. Blending Total

This test consisted of 28 items. All items were administered at posttest but only 13 were administered at pretest. There were three subtests that made up the Blending total. These were consonants (13 items assessing the child's knowledge of single consonant sounds), vowels (six items assessing the child's knowledge of vowel sounds), and consonant blends (nine items assessing the child's knowledge of such beginning and ending consonant blends as "tr---" and "---nk"). It should be noted that while the first two subtests, consonants and vowels, are not strictly blending, they represent precursor skills and were included by CTW under blending in their goals statement.

[1] Appendix A provides a complete listing of the goals of The Electric Company and Appendix B provides a detailed description of the tests, including a copy of the tests.

The content analysis indicated that 19.5 percent of the show was spent in this goal area. Thus the goal area was apparently given both nominal and actual emphasis by CTW. Further, from a curriculum viewpoint, this goal area was clearly one most appropriate for those children in the early grades beginning to learn.

An abstract from Tables 14a and 14b indicates:

Adjusted Difference (viewing minus non-viewing) Scores on Blending Subtests

	Fresno	Youngstown	Percent of show
Consonants	.6**	.8***	9.2%
Vowels	.5**	.3**	2.0
Consonant Blends	.2	.5***	5.1
Blending Total	1.3*	1.6***	19.5%

(Asterisks indicate significance levels as presented in the preceding table)

It is noteworthy that at posttest the mean score for the non-viewing classes was about 21 items correct out of the 28 items. Thus, while there was room for a differential improvement by the viewing classes, even in first grade some ceiling effect was in evidence, especially in the consonant subtest where at posttest the typical percentage correct for non-viewers was in the low nineties.

The Electric Company taught a variety of reading skills which had different levels of difficulty. Knowledge of consonants and vowels was in the less difficult

range, yet for first graders who viewed in-school these two areas were effectively taught by the show. In Youngstown, consonant blends were also effectively taught.

c. Chunking Total

This test consisted of 28 items divided into five subtests:

Vowel Combinations (9 items) e.g., "ou", "ea"

Consonant Digraphs (6 items) e.g., "ch", "sh"

Controlled Vowels (4 items) e.g., "ar", "ir"

Larger Spelling Patterns (5 items) e.g., "all", "alk"

Sight Words (4 items) taken from a list of those taught on the show.

The goal areas assessed by these five tests were strongly emphasized in The Electric Company and constituted 25.4 percent of the show.

The degree of effectiveness with which these goals were taught is evidenced by the following abstract from Tables 14a and 14b.

Adjusted Difference (viewing minus non-viewing) Scores on Chunking Subtests

	Fresno	Youngstown	Percent of show
Vowel Combinations	.5**	.9***	6.0
Consonant Digraphs	.8***	.8***	3.5
Controlled Vowels	.1	.0	1.6
Larger Spelling Patterns	.4**	.6**	3.3
Sight Words	.2	.4***	10.9
Chunking Total	1.9***	2.7***	25.4

Only in controlled vowels were there no significant results in either site. Note, however, that relatively little time was spent on the show with that goal. It was also the hardest subtest in this goal area in that at post-test the mean percentage correct was about 40 percent (25 percent being chance level).

In vowel combinations, consonant digraphs, and larger spelling patterns, both sites showed significant benefit to the first grade viewers over non-viewers. Inspection of the item level data (see Table 15) indicates that on the 20 items in these three subtests, viewers performed as well or better than non-viewers at posttest on 17 items in Fresno and on 18 items in Youngstown. The largest difference seems to occur with one item in consonant digraphs--"ph" (a 20 percent differential favoring viewers in Fresno and a 43 percent differential in Youngstown). This digraph is not normally taught in first grade so that here the difference is probably between being taught by the show and not being taught at all. With an item such as "th" the observed difference in scores is probably primarily between being taught by the teacher in school and on the show on the one hand versus being taught only by the teacher in school. On the "th" item the viewers were favored at posttest by six percent in Fresno and fourteen percent in Youngstown.

The sight words area was assessed by a four-item test that suffered by virtue of the fact that the listing of

sight words to be taught on The Electric Company was not available when the test battery was being constructed. A sizable amount of time on the show was spent on sight words (10.9 percent) but the four items were not a representative sample of what was televised over the six months. The words "Avenue" and "elevator" seem to have been well taught by the show. "Avenue" was part of an often-repeated song, and "elevator" was featured on an animated cartoon. An approximately ten percent differential favoring viewers was obtained on those two words.

In general, the chunking goal areas were effectively taught by the show to first grade, in-school viewing classes. In the two sites combined, viewing classes obtained an average of 2.3 more items correct out of 28 at posttest than their non-viewing pairs.

d. Scanning Total

This test consisted of 14 items and was used to assess a child's ability to attend to structural properties of words. Three subtests were developed:

Final e (6 items) e.g., mate vs. mat

Double Consonants (4 items) e.g., dinner vs diner

Open Syllables (4 items) e.g., hē, gō

The goal areas assessed by these three subtests were not strongly emphasized on the show (about seven percent of the time). The effect of first grade classes viewing in school may be seen from the following abstract of Tables 14a and 14b:

Adjusted Difference (viewing minus non-viewing) Scores on Scanning Subtests

	Fresno	Youngstown	Percent of show
Final e	.7***	.7**	4.5%
Double Consonants	.1	.5***	1.7
Open syllables	.1	.2*	0.9
Scanning Total	1.0**	1.4***	7.1%

The open syllables subtest results indicate that this skill was not influenced greatly by the show. Note too that less than one percent of the show was devoted to that goal. Most time was spent on teaching the final "e" and significant effects were noted in both sites. On each of the six items viewing classes performed better than non-viewing classes at posttest. In Fresno, this difference averaged about nine percent and in Youngstown about 16 percent.

Less clear-cut were the results from the double consonant subtest. In Youngstown, a difference in favor of viewing classes was clearly discernable but this was not so in Fresno. However, in each site the double consonant items proved quite difficult for first graders.

In general, the item level data reflect the results shown in the summary tables. Scanning, as the term was used by CTW, was a difficult skill for first graders and even when significant results were obtained, as in the case of the final "e", about 50 percent of the children in the viewing classes had not attained the goal. We shall, of course,

return to these same goal areas as we move up the grades.

e. Reading for Meaning Total

This was the largest of the test totals consisting of 45 items. The number of items reflects the overall goal of the show which was to insure that children comprehend as well as decode. There were eight subtests to assess this goal area. These were:

Morphemes (10 items) e.g., endings of words--ed, ing

Linear Blending (6 items) reading and comprehending sentences

Syntactic Units (7 items) to derive meaning of a phrase

Punctuation (5 items) e.g., ? , ""

Context Total (9 items) Difficult or ambiguous words are used in sentences whose context give meaning to the words.

Context Vocabulary. Four of the vocabulary words alone are presented to see if children know the words out of context. Not part of context total above.

Context Sentences. The same vocabulary words as above are used in sentences. Part of Context Total above.

Sentence Questions (8 items) Typical reading comprehension questions based on one or two sentences.

The goal areas assessed by these subtests were taught on the show about 21 percent of the time. Obviously, however, any improvement in the child's ability to decode words is

likely to have a positive effect on that child's ability to read for meaning. Thus, the percentage of the show figures below relate to direct efforts to teach the skills (for example, sentence reading, punctuation) rather than less direct efforts to promote comprehension.

The effect on the reading for meaning subtest for first grade classes viewing in school may be seen from the following abstract of Tables 14a and 14b:

Adjusted Difference (viewing minus non-viewing) Scores on Reading for Meaning Subtests

	Fresno	Youngstown	Percent of show
Morphemes	.0	.9***	4.7%
Linear blending	.4**	.6***	9.8
Syntactic units	.2	.8***	0.2
Punctuation	.2*	.6**	4.3
Context total	.3	.9***	2.2
(Vocabulary)	.2*	.5***	---
(Sentences)[1]	.2*	.4***	---
Sentence questions	.4	.9***	not directly taught
Reading for meaning total	1.5	4.5***	21.2%

At this point an effort to interpret why Youngstown first grade viewing classes seem to have benefited significantly more than Fresno on these goals would seem to be in order. A first reaction might be to consider the attainment levels of

[1]Sentences is a subtest of The Context Total.

the first grade classes in the two sites -- perhaps the goals are more appropriate for one level of attainment than for another. Unfortunately for that theory the scores of the two sets of first grade classes seem to be remarkably similar. Likewise, as shall be seen later in this section on the first grade results, other factors such as teaching styles do not seem to be heavily implicated because site differences do not seem to be extensive.

One fact that should be kept in mind was noted in the overviews of the data presented earlier in this chapter. While first grade, rather than second grade, in Youngstown provides the strongest evidence for the efficacy of The Electric Company, the reverse is true in Fresno. As we look at other analyses an attempt will be made to try to uncover some possible reasons for these differences.

f. Grand Total

The difference at posttest between first grade viewing classes and their non-viewing pairs, with pretest covaried, was 5.6 points in Fresno and 10.2 points in Youngstown. In both cases the difference is statistically significant.

Of considerable interest is whether the differential in favor of the viewing classes came from items whose content was directly taught on the show (exact blend or exact word used, for example) or whether the differential came from items whose content was not directly taught on the show.

An example of this latter kind of item would be where the exact word used in an item to test a blend or a consonant was not actually taught directly on the show. In this case the item could be answered only by the transfer of knowledge gained from the show or elsewhere.

In order to look in detail at this question, two groups of 32 items were selected from the battery, one group being the show specific items and the other the non-show specific items. Care was taken to insure the two groups of items were of comparable difficulty at pretest. The results of the subsequent analysis on first grade scores are here abstracted:

Adjusted Difference (viewing minus non-viewing) Scores on Specific and Non-Specific Subtests

	Fresno	Youngstown
Show specific items	1.7**	2.6***
Non-show specific items	1.8**	2.7***

It would seem that, for first grade classes, the effect of the show was as large for the non-show specific items as for the show specific items. What is being learned is not simply rote recall of specific words taught on the show but includes skills the child can transfer to new words and situations.

g. The Individual Test:

As well as the group test -- The Electric Battery -- an individually administered reading test of 36 items was given to a randomly selected 20 percent sample of each class (only

at posttest in first grade). The individual test assessed many of the goals assessed in the group test.

Over all 36 items, the results proved to be significant in Youngstown but not in Fresno. The adjusted difference scores between viewing and non-viewing classes were:

	Individual Test	
	Fresno	Youngstown
Adjusted difference	1.3	5.3***

It should be noted that this individually administered test tended throughout the total study to provide similar findings to those obtained from the group administered Electric Battery. It is instructive in this respect to look too at the item analysis data for the individual test (also contained in Table 15). These data show that certain items were too difficult for first graders (e.g., "oi"). Others were rather easy (e.g., "pl") and others discriminated well between viewing and non-viewing classes (e.g., "ch" and "st").

The individually administered test contained two subtests not included in the total score -- left-right orientation and scrambled sentences. No significant effects of The Electric Company were noted for the left-right orientation test. With scrambled sentences, the task for the children was to put the words into a meaningful order. This sentence unscrambling activity occurred on the show 1.5 percent of the time. A significant effect was noted in Youngstown only.

h. Attitude Tests

Two attitude measures were administered as part of the Electric Battery. The first of these assessed the children's attitude to school. It consisted of nine items in which the child indicated positive or negative affect in relation to various school situations using a happy face-sad face technique. In Fresno no effect was noted -- the viewing and non-viewing classrooms showing similar small gains over the six months of the show. In Youngstown, the effect was significant:

	Viewing Classes		Non-viewing Classes
Pretest	7.2		7.0
Posttest	8.1		7.6
Adjusted difference	.41	Standard error	.16

The second of the attitude tests was an ipsative-type preference test in which school subjects (reading, math, social studies, art, and spelling) were paired and the child indicated a preference. The crucial score for this evaluation was the reading preference score. Since it was paired with each of the other subjects, a maximum preference would be 4.0. In Youngstown no significant effect was noted between first grade viewing and non-viewing classes. In Fresno there was a significant effect favoring the viewing classes.

Thus, with the two attitude tests in the two sites, four statistical tests were calculated. In two of the four tests

viewing classes were significantly positively affected and in the other two instances no significant results were obtained.

i. Metropolitan Tests

At pretest, first grade classes were given one section of the Metropolitan Primer Test and, at posttest, a section of the Metropolitan Primary I. While the main purpose of the test was to enable the designation of target children, an analysis was undertaken to see if viewing The Electric Company had an effect on the viewing classes' mean score on a standardized, normed reading test. The pretest Metropolitan raw score was used as a covariate and the non-viewing classes as a control. No significant result was seen in Fresno. In Youngstown a significant result was obtained as this abstract indicates:

Metropolitan Raw Scores

	Viewing Classes	Non-viewing Classes
Pretest Primer (39 items)	23.2	20.8
Posttest Primary I (35 items)	23.3	18.5
Adjusted difference	2.29	Standard error 1.0

Thus in one site where The Electric Company seemed to be having the greater effect with first grade classes, it also affected performance on a standardized, normed reading achievement test that, obviously, was not itself constructed to assess the goals of the show.

* * *

The previous pages have presented the results in some detail for the in-school viewing experiments in first grade. In succeeding pages the results for second, third, and fourth grades will be presented. The task of retaining some prespective on all these data is not easy. Perhaps the introductory overview is worth returning to. Note too that in Chapter 4, a summary of these more detailed results will also be presented.

3. The In-School Viewing Experiment: Second Grade

The second, third and fourth grade experiments are virtually the same as the first grade experiment described in the preceding sections of this chapter. The only major difference is that the first grade classes were given an attentuated pretest battery but the second and higher grades received the full Electric Battery at pretest. In order to obtain a picture of the specific effects of The Electric Company on second grade classes which viewed in school, the following tables are examined.

--- Table 19 which presents selected pretest and gain scores of viewing and non-viewing pairs of classes in Fresno which were dropped from the study.

--- Tables 20a and 20b which present the pretest, gain, and adjusted gain scores of the viewing and non-viewing second grade classes in Fresno (20a) and Youngstown (20b).

--- Table 21 which presents the mean percentage of children in viewing and non-viewing second grade classes answering each item of the Electric Battery correctly at pretest and posttest in Fresno and Youngstown.

--- Tables 22a and 22b which present the pretest and posttest teacher questionnaire scales and selected items for viewing and non-viewing second grade classes in Fresno (22a) and Youngstown (22b).

--- Tables 23a and 23b which present the results of the observations or reading lessons in second grade viewing classes in Fresno (23a) and Youngstown (23b).

--- Tables 24a and 24b which present the pretest and post-test parent questionnaire scales and selected items for viewing and non-viewing second grade classes in Fresno (24a) and Youngstown (24b).

The Electric Battery

After the data had been collected it was learned that randomization in six pairs of second grade classes in Fresno had not been correctly adhered to. In these pairs, all six control classes were in different schools than the six experimental classes. Although the schools seemed comparable (similar sending areas -- different school bus routings), the control members were in schools that were not yet connected to the closed-circuit television system. Thus, although the assurances that the schools and classes were similar seemed to be borne out by the data, the six pairs were dropped from the study. Table 19 presents the results for these six pairs. Note that the grand total pretest means for viewing and non-viewing pairs are very similar (85.6 and 85.7) but the variances are not (the standard deviations are 11.9 and 6.6 respectively). Differences in gains were in favor of the viewing classes both on the group and the individual tests.

The proper procedure for randomization was not carried out in every instance in the second grade in Fresno because double the number of paired classrooms was needed in second grade and in order to obtain 40 classes in a site where schools are widely dispersed geographically, control classes were selected from schools where there was no television system. As a result of

these factors, the six pairs have been omitted from the major analyses.

The following results for second grade are based on 20 pairs of classes in Youngstown and 14 pairs in Fresno. As in the first grade, a separate analysis was run for each subtest to test the significance of the difference between the adjusted mean gains of the viewing and non-viewing pairs of classes. In this case, the appropriate pretest score was covaried for each subtest separately. It can be seen that when tests and subtests are considered separately for each site, (see Tables 20a and 20b) a pattern of statistical significance occurs. In summary:

(N.S. = not significant; * = significant at .10 level; ** at .05; *** at .01)

Grade 2

	Fresno (14 pairs)	Youngstown (20 pairs)
MATCHING WORDS	**	N.S.
Consonants	**	N.S.
Vowels	N.S.	N.S.
Consonant Blends	*	*
BLENDING TOTAL	*	N.S.
Vowel Combinations	***	N.S.
Consonant Digraphs	***	***
Controlled Vowels	***	N.S.
Larger Spelling Patterns	***	N.S.
Sight Words	**	**
CHUNKING TOTAL	***	*
Final e	***	***
Double Consonants	***	*
Open Syllables	**	N.S.
SCANNING TOTAL	***	*
Morphemes	***	*
Linear Blending	*	***
Syntactic Units	N.S.	***
Punctuation	***	***
Content Total	N.S.	N.S.
Content Vocabulary	***	**
Content Sentences	N.S.	**
Sentence Questions	*	**
READING FOR MEANING TOTAL	**	***
GRAND TOTAL	***	**

Overall, the results of the total test were significant in both sites. The adjusted gain (viewing minus non-viewing) was 5.8 points in Fresno and 2.2 points in Youngstown. The effects seem a little less strong than for first grade. In general, subtests that were significant in Youngstown were also significant in Fresno. However, since the Fresno results were more positive

than Youngstown's in second grade (the reverse of first grade), there were significant results in Fresno that were not replicated in Youngstown.

The blending area provides only partial evidence of significant effect but it is also an area of general competence for many second graders. It is the chunking goal area that accounted for most of Fresno's viewing classes' larger gain than Youngstown's. Fresno's second grade classes gained considerably from the show in the chunking goal area but the results in Youngstown were less positive. This reverses the pattern noted in first grade where Youngstown classes benefited from the show more than Fresno classes. Note again, however, that the Youngstown classes performed better at pretest in this area and had less to gain from the show. At pretest for chunking, Fresno classes had a mean score of 12.4 out of 28 items whereas the mean for the Youngstown classes was about 14.9. This point is perhaps most clearly made when the item level data are consulted. Consider, for example, in the larger spelling patterns subtest, the item testing <u>all</u> as in (b) all. In abstract:

	Fresno		Youngstown	
Mean percentage correct	Viewing	Non-viewing	Viewing	Non-viewing
Pretest	64%	64%	86%	85%
Posttest	91	83	95	90

The Fresno classes started over 20 percentage points lower, and the viewing classes had a differential gain of eight percentage points while the Youngstown viewing classes had a differential

gain of half that amount but at pretest already showed an average of 86 percent correct.

In the scanning goal area it is the final "e" subtest where results were strongly significant in both sites. Here are the item level results on the six items:

	Fresno				Youngstown			
	Pretest		Posttest		Pretest		Posttest	
	View	Non-View	View	Non-View	View	Non-View	View	Non-View
mile	39%	38%	79%	61%	45%	39%	82%	75%
note	40	51	80	71	52	51	86	81
cone	37	39	74	56	41	37	72	63
kite	51	55	91	72	69	60	90	85
robe	12	12	50	27	17	16	50	31
tire	46	40	80	62	45	41	76	68

Clearly the silent "e" is a goal area in which the show benefits second grade classes.

In the reading for meaning goal area the results tended to be more positive for Youngstown than for Fresno classes. Interestingly, this was the hardest group of items in the battery. The subtest that provided significant results in both sites was punctuation. The results of this five item subtest are:

	Fresno		Youngstown	
	Viewing	Non-viewing	Viewing	Non-viewing
Pretest	1.5	1.4	2.0	1.8
Gain	1.4	0.8	1.2	0.7
Adjusted difference: (viewing minus non-viewing)	.63 (SE.14)		.59 (SE.17)	

In both sites the results of the show specific and non-show specific groups of items were similar and significant. Thus, as in first grade, the impact of The Electric Company went beyond the actual examples taught on the show.

The results for the individual tests were similar to those provided by the group tests. The effect of the show as assessed by the individual tests was stronger in Fresno than in Youngstown and the areas of impact seem to be much the same as those described by the group tests. No evidence of attitude changes, as measured by the two attitude scales, was noted. Similarly non-significant was the impact of the show on the Metropolitan tests used for the second grade classes. Differences here were small, favored the viewing classes, but were not larger than the respective standard errors.

* * *

To this point we have examined the data from second grade classes viewed as a whole. However each second grade class can be thought of as having a target component (at or below the 50th centile on national reading norms) and a non-target component (above the 50th centile). The following section of the report will examine the in-school viewing experiment for second grade classes separating the target from the non-target component.

Target and Non-Target Components: Second Grade

According to the stated priorities of CTW, The Electric Company was to focus on the reading problems of those children in second grade who were in the bottom half of the population on national reading norms (the target group). At pretest, all participating second grade classes were administered the Word Knowledge subtest of the Metropolitan Achievement Test, Primary I. On the basis of the results of this test, children were assigned target or non-target status. Thus it was possible to calculate the means and variances of the target children and the non-target children for each class separately. Where a class had no non-target children, that class and its pair were omitted from consideration in the analyses to be reported in the section.

From the overview (see Abstract II) it was seen that the results for the total battery were significant (at the .05 level) for both target and non-target components in Fresno and for the target component in Youngstown. The non-target component in Youngstown also showed effects of the show but the significance level fell between .05 and .10. In abstract:

Adjusted Difference (viewing minus non-viewing Scores of Target and Non-Target Components

	Fresno		Youngstown	
	Mean	SE	Mean	SE
Target	8.6	2.1	2.4	1.1
Non-target	2.3	1.0	0.9	0.7

In both sites the impact in second grade appeared to be greater for target than for non-target components of the sample, (and

significantly in Fresno). The following presentation lays out the size of the impact for each component in each site by each of the tests and subtests. This presentation is an abstract from Tables 25a and 25b (target components) and 26a and 26b (non-target components). (N.S. = not significant; * = significant at .10 level; ** at .05; *** at .01). An x indicates significance favoring the non-viewing classes.

Grade 2

	Target		Non-Target	
	Fresno (14 pairs)	Youngstown (20 pairs)	Fresno (10 pairs)	Youngstown (17 pairs)
MATCHING	**	N.S.	N.S.	N.S.
Consonants	**	N.S.	N.S.	N.S.
Vowels	N.S.	N.S.	x	N.S.
Consonant Blends	**	*	N.S.	N.S.
BLENDING TOTAL	**	N.S.	*	N.S.
Vowel Combinations	***	N.S.	N.S.	*
Consonant Digraphs	***	***	*	N.S.
Controlled Vowels	***	*	N.S.	N.S.
Larger Spelling Patterns	***	N.S.	N.S.	N.S.
Sight Words	**	***	N.S.	N.S.
CHUNKING TOTAL	***	N.S.	*	N.S.
Final e	***	**	**	N.S.
Double Consonants	**	*	N.S.	N.S.
Open Syllables	**	N.S.	N.S.	N.S.
SCANNING TOTAL	***	*	N.S.	N.S.
Morphemes	***	**	N.S.	N.S.
Linear Blending	**	***	N.S.	N.S.
Syntactic Units	*	***	N.S.	N.S.
Punctuation	***	***	N.S.	N.S.
Context	N.S.	N.S.	N.S.	N.S.
Context Vocabulary	***	***	N.S.	N.S.
Context Sentences	**	**	N.S.	N.S.
Sentence Questions	*	***	N.S.	*
READING FOR MEANING TOTAL	**	***	N.S.	*
GRAND TOTAL	***	**	**	*

In general the abstract shows that it is with target rather than non-target second grade components that the show has the greater impact. Specifically, target children in Fresno seem to benefit in all the major goal areas. In Youngstown the target children seem to benefit most from the more difficult reading for meaning area. Note, however, that the target group in Youngstown seems to consist of somewhat better readers than the target group in Fresno. At the subtest level, very few positive results can be seen for the non-target children in either site. One reason is that the non-target children obtain scores of almost 80 percent correct at pretest and over 90 percent at posttest, and there is simply not a great deal for non-target children in second grade to gain on the tests.

It may be remembered that the sampling plan for this research led us to look purposely for schools and classrooms where target children would predominate. Thus in looking at the results that have been presented in this section, the reader should keep in mind that the target component of each is generally much larger than the non-target components. Thus:

Mean Class Sizes of Target and Non-Target Components

	Fresno		Youngstown	
	Viewing	Non-viewing	Viewing	Non-viewing
Target	13.9	16.9	15.8	16.6
Non-Target	7.2	6.2	10.5	8.7

* * *

Overall, the show was seen to be effective in second grade. When classes were divided into target and non-target components the show appeared to be more effective for the target components. This was a hoped for result in that CTW had planned the show with primarily the target group in mind.

4. The In-School Viewing Experiment: Third grade

The overviews of the in-school viewing experiment (see Abstracts I and II) seemed to show a lesser impact of the show in third and fourth grades in comparison to first and second grades. This lesser impact was not so much a matter of failure to obtain statistical significance, but one where the size of the difference between the gains of viewing and non-viewing classes was relatively small. In other words, the viewing classes gained more than the non-viewing classes on the total battery and this difference in gains is believable (statistically significant), but it is rather small nonetheless.

The reason for the small differences is quite clear--by third grade the vast majority of the children have most of the knowledge and skills being tested by The Electric Battery. For example, they know their letter sounds, they know simple consonant blends such as "tr" and "pl", and they can get meaning from simple sentences. On the 123-item pretest battery, third grade classes on the average got all but about 28 items correct and fourth grade classes all but about 18 items correct. Of the relatively few items to be learned (dealing with the relatively more difficult questions), the viewing classes learned significantly more--but there was no room for them to learn, in gross numerical terms, many items more. The question as to whether the test items reflect the difficulty level of the show's content is a moot one. Inasmuch as the items do reflect the difficulty of the show's content, the results indicate that the show was better keyed to first and second grade classes.

In this section of the report the specific effects of viewing The Electric Company in school on third grade classes will be presented in detail. The following tables are relevant.

--Tables 28a and 28b which present the pretest, gain, and adjusted gain scores of the viewing and non-viewing third grade classes in Fresno (28a) and Youngstown (28b).

--Tables 29a and 29b which present the pretest and posttest teacher questionnaire scales and selected items for viewing and non-viewing third grade classes in Fresno (29a) and Youngstown (29b).

--Tables 30a and 30b which present the results of the observations of reading lessons in third grade viewing classes in Fresno (30a) and Youngstown (30b).

--Tables 31a and 31b which present the pretest and posttest parent questionnaire scales and selected items for viewing and non-viewing third grade classes in Fresno (31a) and Youngstown (31b).

The Electric Battery

The results to be presented here are based on ten pairs of classrooms in Fresno and ten pairs in Youngstown. Overall, the sites provide quite similar results on the 123-item grand total. In abstract:

	Fresno		Youngstown	
	Viewing	Non-viewing	Viewing	Non-viewing
Pretest	89.5	93.8	96.7	97.9
Gain	14.8	11.4	12.0	9.3
Adjusted difference (viewing minus non-viewing)	2.4 (SE 1.0)		2.4 (SE 0.9)	

The classes in Youngstown began at a slightly higher level than in Fresno, but the adjusted mean difference in gains between viewing and

non-viewing classes was the same in both sites and it was, in both instances, statistically significant.

In order to look more closely to discover in which goal areas the impact was occurring, the following abstract is presented.

Grade 3

	Fresno	Youngstown
MATCHING WORDS	N.S.	N.S.
Consonants	N.S.	N.S.
Vowels	N.S.	N.S.
Consonant Blends	N.S.	***
BLENDING TOTAL	N.S.	*
Vowel Combinations	N.S.	*
Consonant Digraphs	**	***
Controlled Vowels	N.S.	N.S.
Larger Spelling Patterns	N.S.	***
Sight Words	N.S.	*
CHUNKING TOTAL	*	**
Final e	**	*
Double Consonants	*	N.S.
Open Syllables	*	N.S.
SCANNING TOTAL	**	*
Morphemes	N.S.	N.S.
Linear Blending	N.S.	N.S.
Syntactic Units	N.S.	N.S.
Punctuation	N.S.	N.S.
Context	N.S.	N.S.
Context Vocabulary	**	N.S.
Context Sentences	N.S.	N.S.
Sentence Questions	N.S.	**
READING FOR MEANING TOTAL	*	**
GRAND TOTAL	**	**

The only two goal areas that seem to have been affected by the show were consonant digraphs and final "e"; but the gains positively favored the viewing classes in all but four of the 19 subtests in Fresno and all but two in Youngstown. Thus, there was a general accretion in

favor of the viewing group and significant results occurred in all four total tests in Youngstown (Blending, Chunking, Scanning, and Reading for Meaning) and in three of the four in Fresno. No significant results were obtained in the attitude areas, the Metropolitan test, or the individually administered test.

* * *

It is proper not only to look at the third grade classes as entities but also to look at the results separately in terms of the classes' target components (children in the bottom quarter of reading achievement on national norms) and the non-target components (children above the bottom quarter). The following section presents the relevant analyses.

Target and Non-Target Components: Third Grade

The results for third grade classes taken as entities revealed that The Electric Company had an impact. It also revealed that, with few exceptions, the impact was perforce small since third graders were generally adept in the goal areas and content being tested. In order to examine the question of whether it was the poorer reading third graders, the target group, who showed the greater effect of the show or whether it was the non-target group, the following tables will be referred to:

--Tables 32a and 32b which present the pretest, gain, and adjusted gain scores of the viewing and non-viewing third grade target classes in Fresno (32a) and Youngstown (32b).

--Tables 33a and 33b which present the pretest, gain, and adjusted

gain scores of the viewing and non-viewing third grade non-target classes in Fresno (33a) and Youngstown (33b).

--Tables 34a and 34b which present the pretest and posttest parent questionnaire scales for viewing and non-viewing target and non-target third grade classes in Fresno (34a) and Youngstown (34b).

An abstract from these tables indicates that in terms of the Grand Total on the Electric Battery there were significant results ($p < .10$) for both target and non-target components in both sites (see Abstract II, above). In terms of the mean difference in adjusted gain scores (viewing minus non-viewing components) it can be seen that the effects were quite similar in the two sites:

	Fresno		Youngstown	
	Mean	SE	Mean	SE
Target	3.5	1.5	2.6	1.6
Non-target	1.6	0.9	2.0	0.7

The viewing target groups made slightly higher differential gains than the non-target groups but because the standard errors of the estimates were also higher, the confidence levels were about the same.

In the preceeding section when third grade classes were considered as a whole, an attempt was made to see in what goal areas the impact seemed greatest. This evidence will again be presented but it will be broken down so that the effects on target and non-target components of classes can be seen separately.

(N.S. = not significant; * = significant at .10 level; ** at .05; *** at .01)

Grade 3

	Target		Non-target	
	Fresno (10 pairs)	Youngstown (10 pairs)	Fresno (8 pairs)	Youngstown (10 pairs)
MATCHING WORDS	N.S.	N.S.	**	N.S.
Consonants	N.S.	N.S.	N.S.	*
Vowels	N.S.	N.S.	N.S.	N.S.
Consonant Blends	N.S.	**	N.S.	N.S.
BLENDING TOTAL	N.S.	N.S.	N.S.	***
Vowel Combinations	N.S.	N.S.	*	*
Consonant Digraphs	***	***	N.S.	N.S.
Controlled Vowels	N.S.	N.S.	N.S.	N.S.
Larger Spelling Patterns	N.S.	**	N.S.	N.S.
Sight Words	N.S.	N.S.	N.S.	**
CHUNKING TOTAL	**	**	N.S.	N.S.
Final e	**	N.S.	N.S.	**
Double Consonants	N.S.	N.S.	*	N.S.
Open Syllables	N.S.	N.S.	N.S.	*
SCANNING TOTAL	***	N.S.	**	**
Morphemes	N.S.	N.S.	N.S.	***
Linear Blending	*	N.S.	N.S.	N.S.
Syntactic Units	N.S.	N.S.	N.S.	N.S.
Punctuation	N.S.	N.S.	N.S.	N.S.
Context	N.S.	N.S.	N.S.	N.S.
Context Vocabulary	**	N.S.	N.S.	N.S.
Context Sentences	N.S.	N.S.	*	*
Sentence Questions	N.S.	**	**	N.S.
READING FOR MEANING TOTAL	*	N.S.	*	**
GRAND TOTAL	**	*	*	***

For the target group in Fresno consonant digraphs and final "e" are the two goal areas where much of the impact of viewing occurred, accounting for a third of the differential gain. In Youngstown, consonant digraphs alone accounted for almost a quarter of the target group's gain. For the non-target groups, the impact of viewing seemed to be spread out more thinly across the goal areas. Note that the non-

target classes at pretest had quite high achievement in relation to the test used to assess the goals of the show with an average of only 15 questions wrong out of 123. Thus, the differential gains that occurred could only be in this narrow band. Basically the test developed to assess the impact of the show was not keyed to non-target third graders (those with a reading level in the top 75 percent of their grade.)

The individual test indicated significant impact for non-target children in Fresno only. None of the attitude or Metropolitan tests provided significant results.

* * *

In general The Electric Company had a believable (statistically significant) impact on third graders. Especially with the better reading children, this impact was necessarily limited by the fact that the test's content was not usually geared to their level.

5. The In-School Viewing Experiment: Fourth Grade

The pattern of results presented first in Abstracts I and II and later, in more detail, in the succeeding sections shows that The Electric Company seemed to have a larger impact on the earlier grades where children had more to gain on the reading tests. The results for fourth grade children are in harmony with this pattern. In order to obtain a picture of the specific effects of viewing The Electric Company on fourth grade classes, the following tables should be examined:

--Tables 35a and 35b which present pretest, gain, and adjusted gain scores of viewing and non-viewing fourth grade classes in Fresno (35a) and Youngstown (35b).

--Tables 36a and 36b which present the pretest and posttest teacher questionnaire scales and selected items for viewing and non-viewing fourth grade classes in Fresno (36a) and Youngstown (36b).

--Tables 37a and 37b which present the results of observations of reading lessons in fourth grade viewing classes in Fresno (37a) and Youngstown (37b).

--Tables 38a and 38b which present the pretest and posttest parent questionnaire scales and selected items for viewing and non-viewing fourth grade classes in Fresno (38a) and Youngstown (38b).

The effects in fourth grade are marginal but significant. At pretest the Fresno classes had only about 20 questions on the average in which to improve and the Youngstown classes had fewer than 15. The adjusted mean difference in gain (viewing minus non-viewing) was 1.1 in Fresno and 1.2 in Youngstown. Both these results were significant

but clearly of no great consequence. Three subtests provided significant effects in both sites -- larger spelling patterns, final e, and punctuation.

Target and Non-Target Components: Fourth Grade

The target and non-target components of the fourth grade classes can be examined by referring to the following tables:

--Tables 39a and 39b which present pretest, gain, and adjusted gain scores for viewing and non-viewing fourth grade target classes in Fresno (39a) and Youngstown (39b).

--Tables 40a and 40b which present pretest, gain, and adjusted gain scores for viewing and non-viewing fourth grade non-target classes in Fresno (40a) and Youngstown (40b).

--Tables 41a and 41b which present pretest and posttest parent questionnaire scale scores for viewing and non-viewing fourth grade target and non-target classes in Fresno (41a) and Youngstown (41b).

From Abstract II it was seen that significant effects were obtained with the non-target components of the fourth grade classes in both sites and the target components in Fresno but not Youngstown. The Fresno target group who viewed gained significantly more than the non-viewing group in the areas of vowel combinations, consonant digraphs, larger spelling patterns, final e, and punctuation. In Youngstown, only the punctuation subtest was significant. The Fresno target group also gained significantly more than the non-viewers on the Metropolitan test.

The non-target groups seemed to benefit most from the areas of larger spelling patterns, double consonants, and punctuation. Note

again however that the non-target groups scored, on the average, over 116 correct out of 123 items at pretest. Thus, the significant gains were necessarily marginal in terms of the size of the gains. In Fresno the non-target components of the viewing classes gained 3.9 questions on the average compared to 2.6 for their non-viewing comparisons. In Youngstown the respective gains were 3.6 and 2.0. The effects can be seen mainly in a few items. A large proportion of the items have an average correct response rate at pretest of more than 95 percent. If the tests reflect the level of difficulty of the show, then the fourth grade results indicate that the use of television in the classroom can make a difference but the difference is small if the program is pitched below the level of the group.

6. Results of Teacher Questionnaires, Parent Questionnaires, and Observations of Classes

Discussion of data from teacher questionnaires, parent questionnaires, and observations of classes are presented here rather than in the preceding section that reported test results so that the flow of the major analyses would not be interrupted. These data are necessary for a fuller understanding of the results presented. They provide descriptive information that may be used to demonstrate comparability of classes as well as effects that The Electric Company had on teacher and parent behavior.

a. The Classes

This section presents a description of the teachers and classes in Fresno and Youngstown. The following tables provide the basis for this discussion:

Tables 16a-b and 17a-b for data on first grade classes.
Tables 22a-b and 23a-b for data on second grade classes.
Tables 29a-b and 30a-b for data on third grade classes.
Tables 36a-b and 37a-b for data on fourth grade classes.

It was seen that the number of children pre- and post-tested per class varied between the sites. In Youngstown, where attrition was less and distances between schools smaller (allowing more frequent call backs to get the post-testing accomplished more efficiently), the average number of children tested in each class was about 90 percent of

those enrolled. In Fresno, about 80 percent of those enrolled were tested. Whereas the proportion of children tested in the two sites was different, the mean age of children at pretest hardly varied between the two sites.

The teachers in the two sites had a similar number of years of education (about 17). They also had approximately the same number of years of teaching experience (averaging 12 years), except in first grade where Youngstown teachers had about six more years experience than Fresno teachers.

The attitudes of teachers to educational television, phonics in reading, linguistics in reading, Sesame Street, and the reading performance of their pupils were assessed by the teacher questionnaire at both pretest and posttest. No striking differences in teacher attitudes were observed between sites or between teachers of viewing classrooms and non-viewing classrooms. In general, the teachers seemed to have a positive attitude to the other CTW show, Sesame Street, to the use of a phonics approach to teaching reading, and to the poorer readers in their classes.

In both sites the majority of teachers said they used a phonics approach as the major teaching method. This and similar information from the teacher questionnaires should be looked at in conjunction with the observations conducted in the viewing classrooms. There it was found that teachers spent on the average very little of the time observed specifically teaching phonics. In contrast, the sight read-

ing of whole words, not specifically related to a phonic breakdown, comprised somewhat more time in Fresno and somewhat less time in Youngstown. In general, phonics and whole word approaches seem to have been frequently used by teachers in both sites and the overall impression is that electicism was paramount.

Perhaps the most dramatic difference between the classes on the one hand and the show on the other is that even in first grade the classes in both sites spent about a third of their time in reading phrases and sentences. The show spent only about ten percent of its time in these activities.

The biggest differences between the sites' reading instruction programs seem to be in their choice of text books and the use of "child-centered" instruction techniques. The majority of teachers in the first through third grades in Youngstown used the Scott Foresman Basic Readers and in fourth grade almost all used The Ginn Basic Readers. In Fresno, different reading texts were in use though the Harper and Row series was most common. From the observations it appeared that in Youngstown in the earlier grades more time was spent on "child-centered instruction" -- that is, where the teacher was not actively teaching but the child was pursuing a reading activity relatively independently. This did not occur in the third and fourth grades.

Of keen interest to this evaluation is how The Electric Company was included in the class timetable. Was the time taken by the show subtracted from other reading activities or did it come from other subject areas? Some teachers do not find it easy to supply a clear answer to this question because a strict timetable is not adhered to in their classrooms and because reading, in the early grades especially, is a pervasive subject that crops up in virtually every lesson including mathematics, social studies, science, and even music and art. If a central theme or project approach is used in a class, many subjects tend to be fused or integrated and again it is difficult to estimate with accuracy how much time is typically spent on an activity such as reading.

The question nonetheless has to be asked because the answer can have a considerable impact on the interpretation of the experimental results. If The Electric Company had been timetabled in classrooms so that it added to the amount of reading time, then positive results, while still being influenced by the show, would raise the alternative hypothesis that an additional half hour of reading instruction of any type per day might have had a similar impact. Further one would ask whether the time so taken from some other area (say social studies) had had a deleterious effect on the classes' performance there. If, on the other hand, The Electric Company had simply been substituted for other forms

of reading instruction, then the question of negative impact on other subjects would lose prominence. The alternative hypothesis that it was increased time rather than the show itself would be unreasonable, and the show would have to be at least as beneficial as the reading instruction it displaced even for no differences to be noted between experimental and control classes.

It was decided not to attempt to experimentally manipulate or control the variable of time spent on reading for several reasons. First, there is always a problem in large scale field research in obtaining the necessary cooperation of other institutions. In this case, school boards, administrators, and teachers were already being asked to permit or to make sizable changes in school activities, including extra hours of classroom testing, classroom viewing of an unknown television show over a six-month period, the intrusion of an observer, the filling out of questionnaires, and the collection of parent questionnaires. Second, even if permission had been granted for a fiat to be issued indicating how much time was to be spent on reading in each classroom, there is considerable doubt about how well that would have been observed. Professional teachers, knowing best what the needs of their classes are, will often "sneak" some time from one subject area to bolster performance in another with greater need. It was decided, therefore, to let the teachers

and administrators use their own judgments on time allocation and for us to assess the amount of time spent.

At pretest and again at posttest teachers were asked how much time they spent teaching reading. It was expected that at pretest the viewing and non-viewing classrooms would be similar on the average due to randomization and that any divergence at the posttest would represent the impact of the show.

It was apparent from a review of the teacher questionnaire responses that there was a great deal of variability within sites. For example, an abstract of the responses of viewing (V) and non-viewing (NV) teachers in first grade classes indicates:

		Fresno				Youngstown			
		Pre		Post		Pre		Post	
		V	NV	V	NV	V	NV	V	NV
Time for Reading	Mean	545	590	524	586	541	550	583	513
(minutes per week)	SD	211	141	181	165	135	117	139	122

Because of this large variability (as indicated by the standard deviations), quite large differences in the means would be needed to indicate significance. In general, however, significant differences were not noted. In later grades. teachers reported spending less time on reading instruction than in first grade.

As well as these results which address indirectly the question of where time for viewing The Electric Company came

from, all experimental teachers were asked the question directly. In first grade in Fresno, six of the 11 teachers said they used the normal time allotted to reading, four of the others took the time from such other subjects as Social Studies, Science, Music, and Art, and one used rest and recreation time. In Youngstown, three out of the ten teachers used the regular reading instruction time, six used time from other subjects, and one used rest and recreation time. Thus, of the 21 teachers of first grade viewing classes, 12 used time normally devoted to areas other than reading. In second grade, about two-thirds of the teachers said they took the time out of regular reading instructions; in third and fourth grades about half did.

In order to find out whether it was the extra time that caused the significant effect, the performance of first grade classes who took the time from other subjects was compared with the performance of the first grade classes who retained their normal time allocation for reading (substituting The Electric Company for other reading instruction). The total adjusted scores of the viewing classes which took extra time for reading as a result of the presence of The Electric Company were compared with the scores of their paired non-viewing classes separately in each site. Similarly, this comparison was also carried out for those classes who took time out of the regular reading time to view the show. The results were:

	Fresno				Youngstown			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=5 pairs		Time from other subjects		N=7 pairs			
Viewing	15.8	76.1	60.4		15.9	81.5	65.5	
Non-Viewing	15.9	71.8	56.0		15.1	67.1	52.0	
Viewing minus Non-Viewing	-0.1	4.3	4.4	4.5	0.9	14.4	13.5	9.6
ES of Estimate	0.9	4.3	3.9	4.8	0.7	4.3	3.7	2.6
	N=6 pairs		Time from reading		N=3 pairs			
Viewing	14.7	72.0	57.4		15.9	78.6	62.7	
Non-Viewing	16.3	72.7	54.4		15.1	63.8	48.7	
Viewing minus Non-Viewing	-1.7	1.3	3.0	9.3	0.8	14.8	14.0	11.2
SE of Estimate	0.6	3.3	2.8	3.4	1.5	6.7	5.2	1.2

The results indicate that both in Fresno and in Youngstown first grade classes which took time out of their regular reading programs to view The Electric Company gained significantly from the experience. When time was taken from other subjects (thereby increasing the total amount of time spent on teaching reading) the impact of The Electric Company was significant only in Youngstown. Nothing in these analyses indicates that additional time in reading was responsible for the significant results obtained with first grade viewing classes. The same analyses could not be performed in the other grades because the great majority of teachers in any one site and in any one

	Fresno				Youngstown			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=5 pairs		Time from other subjects			N=7 pairs		
Viewing	15.8	76.1	60.4		15.9	81.5	65.5	
Non-Viewing	15.9	71.8	56.0		15.1	67.1	52.0	
Viewing minus Non-Viewing	-0.1	4.3	4.4	4.5	0.9	14.4	13.5	9.6
ES of Estimate	0.9	4.3	3.9	4.8	0.7	4.3	3.7	2.6
	N=6 pairs		Time from reading			N=3 pairs		
Viewing	14.7	72.0	57.4		15.9	78.6	62.7	
Non-Viewing	16.3	72.7	54.4		15.1	63.8	48.7	
Viewing minus Non-Viewing	-1.7	1.3	3.0	9.3	0.8	14.8	14.0	11.2
SE of Estimate	0.6	3.3	2.8	3.4	1.5	6.7	5.2	1.7

The results indicate that both in Fresno and in Youngstown first grade classes which took time out of their regular reading programs to view The Electric Company gained significantly from the experience. When time was taken from other subjects (thereby increasing the total amount of time spent on teaching reading) the impact of The Electric Company was significant only in Youngstown. Nothing in these analyses indicates that additional time in reading was responsible for the significant results obtained with first grade viewing classes. The same analyses could not be performed in the other grades because the great majority of teachers in any one site and in any one

grade tended to adopt one or the other pattern -- that is, almost all took time from reading or almost all did not; so there was no opportunity for a useful comparison.

One problem still remains though it is a less pressing one. The problem is, what is the effect on other subjects when time is taken from them for viewing The Electric Company? The potential negative side-effect of taking time from other subject areas is currently under investigation in the ETS follow-up on this in-school viewing study.

Teachers who used The Electric Company in their classes rated the program's usefulness in teaching various skills on a five point scale. In both sites the ratings were generally positive but in Youngstown the ratings seemed somewhat more positive than in Fresno in first and second grades while the reverse was true in third and fourth grades. In all grades one of the highest ratings was given to the show's usefulness in reviewing phonics. Also highly rated were the show's effectiveness in teaching phonics and letter groups. The show was rated by the vast majority of teachers as having appropriate attention-holding characteristics, vocabulary level, pace, methods of presentation, and subject matter.

On the average, the teachers were not on the negative side on the 18 ratings of The Electric Company. The poorest ratings were in the show's ability to teach comprehension,

morphemes, and syntax. In Fresno, but not in Youngstown, first and second grade teachers tended to be neutral or somewhat negative toward the show's vocabulary level, pace, method of presentation, and subject matter.

b. The Parents

It is, of course, important to know something of the home and parental background of the children in the study in order to be able to describe the sample, to compare the composition of viewing and non-viewing classes to ensure comparability on important factors, and to look for possible mediating factors in the learning of the children.

Parent questionnaires were distributed and collected by classroom teachers at pretest and again at posttest. The rate of response was reasonably high though it dropped off somewhat at posttest, possibly in reaction to the fact that questions were repeated. The rates of return were:

	Fresno						Youngstown					
	Viewers			Non-Viewers			Viewers			Non-Viewers		
Grade	Pre	Post	Pre or Post	Pre	Post	Pre or Post	Pre	Post	Pre or Post	Pre	Post	Pre or Post
1	81%	71%	90%	70%	61%	85%	80%	75%	90%	83%	74%	90%
2	85	74	92	75	72	88	83	72	89	80	72	88
3	78	63	84	65	63	81	75	68	87	79	57	85
4	87	70	93	69	64	84	86	68	90	82	68	89

The posttest parent questionnaire was identical to the pretest questionnaire for two major reasons. First and more obviously it was important to see if differences occurred in the responses and attitudes of parents of viewing children in contrast to control children. As well, since some parents who did not respond at pretest might do so at posstest, items assessing such factors as level of parents' education were repeated. The response rates of parents returning one or both questionnaires is given above and indicates responses from all but about ten percent of the parents. In this way, a clearer description of the parents of the sampled children was obtained.

The scale scores derived from the parent questionnaire reflect the different populations the sites represent. Child affluence, parental affluence, and years of education all were somewhat higher in Youngstown than Fresno. Again the decision to keep the analyses separate for the two sites seems to be validated.

The important questions are whether viewing classes and non-viewing classes were comparable within each site at pretest and whether they continued to be at posttest. In general, the parent questionnaire data reflect slight differences at pretest, but these were not regarded as important, especially when it is recalled that response rates were not identical. As a whole the parents were not

as well educated as the national average. The mean percentage of high school graduates in the sample was less than 40 percent, whereas for the age group represented a national figure would be close to 70 percent. This was to be expected in view of our deliberate policy of looking for schools where reading problems and The Electric Company target groups were to be found. In similar fashion, it is interesting to note that the school expectation scale indicates that the parents see their children as doing only as well as or poorer than most other children (a mean of 7.0 would indicate an expectation of average performance).

Other pieces of information from the parent questionnaire include the prevalence of color televisions in the homes. The respondents indicated about 50 percent have color television in contrast to a national average only about five percentage points higher. (Note, however, that all classes in Fresno and half the classes in Youngstown viewed The Electric Company on black and white sets in school.)

In general, changes from pretest to posttest in the responses of parents of viewing children were similar to the changes on the responses of parents of non-viewing children. An exception to this was the response in first grade to the question, "How well does your child read? At pretest the responses of the two groups of parents were similar. At posttest, however, the parents of the viewing classes were

as well educated as the national average. The mean percentage of high school graduates in the sample was less than 40 percent, whereas for the age group represented a national figure would be close to 70 percent. This was to be expected in view of our deliberate policy of looking for schools where reading problems and The Electric Company target groups were to be found. In similar fashion, it is interesting to note that the school expectation scale indicates that the parents see their children as doing only as well as or poorer than most other children (a mean of 7.0 would indicate an expectation of average performance).

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In general, changes from pretest to posttest in the responses of parents of viewing children were similar to the changes on the responses of parents of non-viewing children. An exception to this was the response in first grade to the question, "How well does your child read? At pretest the responses of the two groups of parents were similar. At posttest, however, the parents of the viewing classes were

significantly more likely to say they thought their children were reading about the same or better than most children. In abstract:

Average Percentage Responding that their First Grade Children Read as Well as or Better Than Most Children

	Fresno		Youngstown	
	Pre	Post	Pre	Post
Viewing	58%	84%	60%	86%
Non-viewing	64	69	63	69

Information from and about the parents of target and non-target children are also reported in the Tables in Volume 2.* Both in Fresno and Youngstown the parents of the non-target children are seen to be more affluent, had more education, fewer children, read more to their children, and had higher school expectations for their children than the parents of the target children. This is hardly a surprise since it is quite consonant with previous research on socio-economic status (variously defined) and achievement in school.

*See Tables 27a-b for second grade, Tables 34a-b for third grade, and Tables 41a-b for fourth grade.

7. Analyses of Various Population Groups in the In-School Viewing Experiment

To this point the data from the in-school viewing experiment have been examined separately by grade and by site using the paired classrooms as the unit of analysis. The data have also been examined separately by target children as one component of the classes and by non-target children as another component.

In this section, the data from the in-school viewing experiment will be reexamined, this time to determine whether The Electric Company worked for boys, girls, and for other populations -- Spanish background, black, and white. It should be noted that the initial site selection had been made with the realization that in Fresno there would be a substantial proportion of children with a Spanish background and in Youngstown there would be a substantial proportion of black children. This, coupled with the random allocation of members of paired classes to treatment or control conditions, allows analyses to be conducted to determine whether the show is effective for white, black, and Spanish-background children when compared with their counterparts in non-viewing classes. Similarly, boys (or girls) who are in classes which view versus boys (or girls) who are in classes which do not view can be compared. Direct comparisons between different groups of viewing children (for example, boys versus girls or black versus white) should be avoided because site is confounded with population (in that Spanish background is associated with Fresno and black is associated with Youngstown) and because the original sampling and pairing were carried out without

special regard for sex or background of the children. While it is inappropriate to make inter-population comparisons, it is not inappropriate to make intra-population comparisons. That is, the question is whether a particular group who views gains from that experience in comparison with a similar group who does not view.

a. Sex Groups

Each class in the in-school viewing study contained both boys and girls. A mean total score for boys and for girls was computed separately for each viewing class and for each non-viewing paired class. This was done for each grade in each site. Abstract III provides the main details. Note that all classes had both boys and girls so no pairs of classes were dropped in this analysis.

At pretest, girls outperformed boys slightly but consistently in each grade in both sites. This is in line with most previous studies of sex differences in reading achievement in the early school grades. In first grade in both sites the gains of the viewing boys and girls were significantly larger than those of their non-viewing counterparts.

In second grade in both sites the boys who viewed gained significantly more on the battery than those who did not view. For girls the results were less clear-cut. In Youngstown, but not in Fresno, the gains of the viewing girls were significantly greater than those of the non-viewing girls. These results are particularly interesting when seen against the background of the results of the intact classes (see

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	Girls Fresno				Boys Fresno			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=11 pairs			Grade 1*	N=11 pairs			
Viewing	15.4	75.1	59.8		15.0	72.4	57.5	
Non-viewing	16.5	74.3	57.8		15.8	68.6	52.8	
Viewing minus Non-viewing	-1.2	0.8	2.0	5.8	-0.8	3.9	4.7	6.6
SE of Estimate	0.5	3.1	2.8	3.2	0.7	3.8	3.4	3.5
	N=14 pairs			Grade 2	N=14 pairs			
Viewing	72.6	99.9	27.3		68.6	98.6	30.0	
Non-viewing	65.0	89.5	24.5		65.3	87.0	21.7	
Viewing minus Non-viewing	7.6	10.4	2.8	2.6	3.3	11.6	8.3	8.9
SE of Estimate	3.7	4.2	1.8	2.2	2.9	3.0	1.9	2.0
	N=10 pairs			Grade 3	N=10 pairs			
Viewing	89.0	104.6	15.5		89.0	103.8	14.8	
Non-viewing	96.5	108.1	11.5		92.2	103.6	11.4	
Viewing minus Non-viewing	-7.5	-3.5	4.0	1.4	-3.2	0.2	3.4	2.7
SE of Estimate	4.6	3.1	1.8	1.0	3.2	2.7	1.3	1.3
	N=11 pairs			Grade 4	N=11 pairs			
Viewing	107.4	114.5	7.1		102.5	111.2	8.7	
Non-viewing	102.3	109.7	7.5		96.9	104.9	8.0	
Viewing minus Non-viewing	5.1	4.8	-0.3	1.7	5.6	6.3	0.7	1.2
SE of Estimate	3.0	1.9	1.3	0.7	3.0	2.9	1.0	1.2

	Girls Youngstown				Boys Youngstown			
	N=10 pairs			Grade 1*	N=10 pairs			
Viewing	16.0	82.2	66.3		15.9	78.7	62.7	
Non-viewing	15.4	70.2	54.8		14.8	62.6	47.8	
Viewing minus Non-viewing	0.6	12.1	11.5	9.5	1.2	16.0	14.9	11.1
SE of Estimate	0.8	4.0	3.3	2.0	0.6	3.3	2.8	2.2
	N=20 pairs			Grade 2	N=20 pairs			
Viewing	84.5	106.4	21.9		79.5	100.9	25.4	
Non-viewing	76.4	97.9	21.5		73.0	95.6	22.5	
Viewing minus Non-viewing	8.1	8.5	0.4	2.0	6.5	5.4	2.9	3.0
SE of Estimate	2.8	2.4	1.1	1.1	2.6	2.7	1.0	1.1
	N=10 pairs			Grade 3	N=10 pairs			
Viewing	98.2	109.4	11.2		95.1	107.7	12.6	
Non-viewing	99.5	108.8	9.3		96.1	105.4	9.2	
Viewing minus Non-viewing	-1.3	0.6	1.9	1.5	-1.0	2.3	3.3	3.1
SE of Estimate	2.7	2.0	1.1	0.8	2.9	2.4	1.4	1.3
	N=10 pairs			Grade 4	N=10 pairs			
Viewing	111.6	116.2	4.5		107.7	114.2	6.5	
Non-viewing	111.1	114.9	3.8		108.6	113.3	4.7	
Viewing minus Non-viewing	0.5	1.3	0.8	1.0	-0.9	0.9	1.8	1.3
SE of Estimate	1.2	0.8	0.5	0.3	2.1	1.2	1.2	0.7

*Written pretest

Abstract I). Then it was noted that in second grade, Fresno viewing classes gained more than Youngstown viewing classes in relation to their respective controls. It is clear from Abstract III that the boys in Fresno were primarily responsible for that result. Note that Fresno second grade boys started somewhat lower at pretest than Youngstown boys and the non-viewing Fresno boys dropped further behind the non-viewing Youngstown boys. However, the viewing Fresno boys gained substantially and their differential gains over the non-viewing boys were more than four times greater than the standard error of that difference. It is also interesting to note in passing that in both sites in second grade the viewing boys outperformed the non-viewing girls at posttest.

The third grade results generally parallel those of second grade. Again the results were significant for boys in both sites, with viewing boys clearly outgaining non-viewing boys. Again, too, the viewing girls outgained non-viewing girls but the difference in gains was significant only in Youngstown.

In fourth grade a reversal of the pattern noted in second and third grade occurs. In every instance viewers outgained their comparison non-viewing group but here the difference in gains was significant for girls in both sites; for boys, however, a significant difference in gains occured in Youngstown but not Fresno. As was seen in previous examinations of the data from the fourth grade classes (especially the non-

target components), the size of the gains was limited by high pretest scores. Thus, for example, girls in Youngstown at pretest obtained, on the average, all but about 12 questions correct.

Overall, the results for both sites, while differing slightly at some grade levels, provide a degree of consistency. The first grade results indicated that boys and girls both benefited from viewing The Electric Company. The second and third grade results tended to favor the boys and the fourth grade results tended to favor the girls. In all grades boys' pretest scores were somewhat lower than the girls' -- that is, boys were in somewhat higher proportions in target than non-target groups. It was seen earlier that target children seemed somewhat better helped by the show in second and third grades and non-target children in fourth grade (probably due to a few rather difficult items and content pieces on the show), and the results on sex differences at each grade level seem consonant with these earlier findings.

b. Race and Language Groups

The populations being studied in the two sites differed and there were site differences in results. Therefore, it is not reasonable to make comparisons among the three groups being studied here--Spanish background, black, and white. Comparisons to be made will be within each group, looking at viewers versus non-viewers.

The analyses in this section were conducted using the same techniques as described in previous sections. That is,

for each class in Fresno the scores of the Spanish-background children and the white children were processed as separate components. For each class in Youngstown each class score was similarly broken into two components, one for black children and one for white children. Because the population breakdown was about 50-40-10 (Spanish-white-other) in Fresno and 50-50 (black-white) in Youngstown, the decision to drop pairs of classrooms from the analyses where a component was not represented led to only a few pairs being dropped.

Spanish-background and white components: Fresno

The definition of Spanish has to be made in terms of the procedures adopted in the field work for this evaluation. As each class was tested children who spoke only Spanish and who, therefore, could not take the test in English were dropped from the sample. In fact only some 40 children were eliminated on these grounds. Teachers classified the children in their classes as to whether they had a Spanish background and whether the children tested could speak Spanish as well as English. About 80 percent of the Spanish-background children could speak Spanish and English, so the Spanish-background component of the Fresno classes is heavily bilingual.

The results of the Spanish background and white component analysis in Fresno are presented in Abstract IV. It can be seen that Spanish-background children benefited significantly from viewing The Electric Company in comparison to their non-viewing counterparts in first, second, and third grades. The

Abstract IV

The In-school Viewing Experiment: An Overview of the Effects on Different Population Groups

	Fresno Whites				Fresno Spanish			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=10 pairs			Grade 1*	N=11 pairs			
Viewing	15.7	79.1	63.4		14.6	71.2	56.5	
Non-viewing	17.0	76.1	59.1		15.9	65.4	49.5	
Viewing minus Non-viewing	-1.4	3.0	4.4	7.4	-1.2	5.8	7.0	8.6
SE of Estimate	1.0	3.6	2.9	2.3	1.2	4.1	3.4	3.5
	N=12 pairs			Grade 2	N=14 pairs			
Viewing	70.6	101.6	31.0		66.6	94.8	28.2	
Non-viewing	66.6	90.5	23.9		62.3	85.5	23.2	
Viewing minus Non-viewing	3.9	11.1	7.2	6.2	4.3	9.3	5.0	5.1
SE of Estimate	4.0	5.7	2.8	3.0	3.2	3.9	2.4	2.7
	N=9 pairs			Grade 3	N=10 pairs			
Viewing	97.1	109.7	12.6		85.9	101.8	15.9	
Non-viewing	94.6	109.5	14.9		90.0	102.0	12.0	
Viewing minus Non-viewing	2.5	0.2	-2.4	-1.7	-4.2	-0.3	3.9	3.3
SE of Estimate	3.9	3.6	2.3	2.5	4.5	4.0	1.4	1.4
	N=9 pairs			Grade 4	N=11 pairs			
Viewing	108.3	115.2	6.7		104.5	111.2	6.8	
Non-viewing	105.8	111.8	5.9		98.7	104.8	6.2	
Viewing minus Non-viewing	2.7	3.4	0.7	1.6	5.8	6.4	0.6	1.9
SE of Estimate	3.9	2.8	1.5	0.9	2.8	2.9	2.1	2.6
	Youngstown Whites				Youngstown Blacks			
	N=9 pairs			Grade 1*	N=6 pairs			
Viewing	16.6	85.1	68.5		13.8	67.1	53.3	
Non-viewing	15.2	67.5	52.4		14.1	53.9	39.8	
Viewing minus Non-viewing	1.4	17.6	16.2	10.8	-0.3	13.2	13.5	13.8
SE of Estimate	0.7	3.6	3.5	2.5	1.2	4.1	3.4	3.2
	N=17 pairs			Grade 2	N=15 pairs			
Viewing	80.6	104.9	24.3		74.1	99.3	25.2	
Non-viewing	75.4	97.7	22.3		70.4	94.4	24.1	
Viewing minus Non-viewing	5.2	7.2	1.9	2.5	3.7	4.9	1.2	2.0
SE of Estimate	2.8	2.2	3.0	2.3	3.4	2.9	1.5	1.4
	N=7 pairs			Grade 3	N=9 pairs			
Viewing	102.1	112.4	10.3		95.9	107.7	11.9	
Non-viewing	96.3	107.8	11.5		97.3	106.6	9.2	
Viewing minus Non-viewing	5.7	4.6	-1.2	2.5	-1.5	1.2	2.7	2.2
SE of Estimate	5.5	2.9	4.2	2.8	2.8	2.1	1.2	0.9
	N=8 pairs			Grade 4	N=7 pairs			
Viewing	108.7	112.6	3.9		108.4	114.4	6.1	
Non-viewing	113.2	116.6	3.4		107.7	112.6	4.9	
Viewing minus Non-viewing	-4.4	-4.0	0.4	0.6	0.7	1.9	1.2	1.5
SE of Estimate	4.2	4.3	0.3	0.4	2.2	1.0	1.2	0.3

*Kindergarten pretest

first and second grade results indicate a relatively substantial gain by the viewing children and the third grade results also indicate a rather large benefit for viewers in comparison to overall third grade results presented in Abstract I. In fourth grade, the results were not significant though they continued to favor the viewing children.

The results seem to indicate quite clearly that viewing The Electric Company in school had beneficial results for Spanish-background bilingual and English-speaking children in the first three grades.

The results for the white children in Fresno, also presented in Abstract IV, indicate that The Electric Company significantly benefited viewers in first, second, and fourth grades. The greatest benefit, in terms of actual raw score differential gain over non-viewers, occured in first and second grades. The third grade results are interesting in that this is one of the quite rare occasions for the in-school viewing experiment when non-viewers gained more than the viewers. The difference favoring the non-viewers is quite small (adjusted difference is 1.7 items) and the standard error of this difference is much larger (2.5). Thus, in Fresno, for the white as well as the Spanish-background children, the results indicating the utility of The Electric Company are especially clear in the first two grades. In the later grades the differential is smaller but still significantly favors the Spanish-background viewers in third grade and the white viewers in fourth grade.

Black and white components: Youngstown

The basic procedure adopted here was the same as was adopted in the Spanish background-white study in Fresno. More pairs of classrooms were lost in Youngstown, however, because there were some all-white or all-black classes. The results of the breakdown of the classes into black components and white components are presented in Abstract IV.

The black children gained significantly from viewing The Electric Company in all four grades, though the second grade significance level was marginal ($p < .10$). The first grade results were particularly strong and reflect the results obtained overall for first grade classes in Youngstown. By the same token, the relatively weak second grade results also reflect the overall second grade results for Youngstown. The major point is that, as a group, black children benefited from viewing the show and the impact was not confined to any one grade.

The white children's total scores treated as components of the Youngstown class scores also showed differential gains from viewing The Electric Company, the effect being significant in first and second grades and marginally so in fourth grade ($p < .10$). This pattern of results is virtually the same as was seen with white children in Fresno. In terms of size of effect, the major effects seem to be occuring in first and second grades.

Thus, overall, white children and black children in Youngstown both seemed to benefit from the show in much the same way and to a similar degree as Spanish-background children and white children did in Fresno. The Electric Company seemed to have positive benefits for in-school viewing children, especially those in first and second grades. This effect seemed to occur for all population groups whose scores were subject to analysis.

8. Analysis of Color and Black and White Television Reception

A question of importance to those interested in communications research concerns the effect of the type of television reception (color versus black and white) on the learning of the viewer. There was no opportunity to study this question rigorously with respect to The Electric Company in the at-home viewing experiments because the type of set used to receive The Electric Company was inextricably confounded with many factors including the social and economic status of the family. For the in-school viewing study, however, an experiment to assess the differential impact of viewing the show in color versus black and white was possible in Youngstown but not Fresno. (In Fresno, the show was telecast in black and white only on county-wide, closed-circuit television.)

In Youngstown, there were ten experimental classes in each of the first, third, and fourth grades and 20 experimental classes in second grade. It was decided to assign to a random half of the experimental classes in each grade a color television receiver, the others receiving a black and white set. It was thus possible to compare the effects of the show when viewed in color with the effects when viewed in black and white.

Abstract V provides the pertinent data on this experiment. The classes that viewed the show in color are compared with their non-viewing paired classes. Similarly the classes that viewed on black and white sets are compared with their paired control classes. It is thus possible to see if the effects of viewing were stronger with the color or the black and white reception.

[illegible] Viewing of Color and Black & White Television Instruction

	Color TV				Black & White TV			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
	N=5 pairs			Grade 1*	N=5 pairs			
Viewing	15.7	78.7	63.1		16.1	82.4	66.3	
Non-viewing	14.6	65.1	50.5		15.6	67.1	51.6	
Viewing minus Non-viewing	1.1	13.7	12.6	5.3	0.5	15.3	14.7	12.8
SE of Estimate	0.6	4.9	4.2	1.1	1.1	5.3	4.3	2.4
	N=10 pairs			Grade 2	N=10 pairs			
Viewing	83.1	104.4	21.3		76.4	102.1	25.8	
Non-viewing	78.8	98.6	19.8		70.7	94.9	24.2	
Viewing minus Non-viewing	4.4	5.9	1.5	2.0	5.7	7.2	1.5	2.3
SE of Estimate	3.0	3.0	1.3	1.6	4.0	3.6	1.1	1.2
	N=5 pairs			Grade 3	N=5 pairs			
Viewing	94.0	107.0	13.3		99.3	110.1	10.7	
Non-viewing	99.1	108.7	9.6		96.7	105.6	9.0	
Viewing minus Non-viewing	-5.0	-1.4	3.7	2.3	2.7	4.5	1.8	3.2
SE of Estimate	3.9	2.9	1.2	0.9	2.2	1.7	1.8	2.0
	N=5 pairs			Grade 4	N=5 pairs			
Viewing	108.5	114.5	6.1		110.8	115.8	5.0	
Non-viewing	110.7	114.8	4.1		108.5	113.1	4.6	
Viewing minus Non-viewing	-2.2	-0.3	1.9	0.5	2.2	2.7	0.5	1.4
SE of Estimate	1.1	0.4	0.8	0.4	2.5	1.6	1.3	0.9

*24-item pretest

It should be noted that the N's were quite small so that the power of any statistical testing would not be great. Nonetheless, the results indicate a rather close similarity between viewing in color and viewing in black and white. In first, second, and fourth grades the effect was slightly in favor of those classes which viewed with black and white sets and in third grade it favored those that viewed in color. The color sets, though more expensive, do not seem to enhance the learning of the classes who view with them.

This is not to say that judgment is here passed on the aesthetic, motivational, or emotional impact of color over black and white reception. These were topics that were not directly addressed in this research. We do know that some teachers with black and white sets complained that there were technical difficulties (words on the show blending into the background material, for example) that they felt color reception would have overcome. Some teachers, after seeing the show both on color and black and white sets, argued that color was more attention getting and attention holding. However, the point is that in terms of learning in the Youngstown viewing classrooms, color television did not seem to have a stronger impact than black and white television.

9. Analyses of Attendance Records

In order to see if viewing The Electric Company had a positive effect on the attitudes of the viewers towards school, an unobtrusive non-reactive measure -- the classes' attendance records -- was obtained. It was argued that if The Electric Company has a positive impact, children would regard school in a more positive fashion and would be less likely to want to stay home. The problem with this measure, as indeed with most such measures, is that there is a considerable jump from the assessment (in this case the attendance records) to the actual construct being measured (attitude to school). However, every attitude measure has its own inherent problems and already incorporated into the Electric Battery were two different paper and pencil attitude tests. Because of the ultimate importance of the attitude area to later reading behavior, and because multiple assessments of variables is desirable when no single assessment has great construct validity, the attendance records were collected and analyzed.

As in the other analyses, data for each grade and each site were kept separate. The attendance data were then analyzed by calculating the average absentee rates for viewing classes and for non-viewing classes separately for the months of September and October (per-program base rate) and November through May (during the telecast). The relevant means and standard deviations are here presented.

Average Daily Absentee Rates of Viewing and Non-Viewing Classes in Fresno and Youngstown

	September and October				November through May			
	Fresno		Youngstown		Fresno		Youngstown	
	M	SD	M	SD	M	SD	M	SD
Grade 1:								
Viewing	6.6%	2.4%	5.7%	1.0%	8.4%	2.5%	8.8%	2.6%
Non-viewing	7.1	2.6	7.2	3.3	8.9	2.4	9.9	3.0
Grade 2:								
Viewing	4.9	1.9	5.3	2.1	7.8	1.8	7.9	1.9
Non-Viewing	5.3	2.2	5.1	1.8	7.4	1.6	7.9	1.6
Grade 3:								
Viewing	5.0	1.8	5.5	0.9	7.6	1.4	8.6	1.0
Non-Viewing	3.4	0.9	4.7	1.9	6.3	1.5	7.2	1.1
Grade 4:								
Viewing	4.9	1.4	4.7	1.0	6.9	2.2	7.2	1.3
Non-Viewing	4.6	1.8	5.1	1.7	6.6	2.6	7.7	2.2

It can be seen that absentee rates were quite low (less than 10 percent) in each site at each grade both early in the academic year (pre-program) and later (during the program). There does not seem to be any systematic difference between the absentee rates of the viewing and non-viewing classes before the program was telecast or during the time of telecasting.

10. Some Exploratory Analyses

a. Analysis of Individuals by Initial Reading Achievement Scores

To this point all the analyses of the in-school viewing experiments have been in terms of the paired classrooms. The reasons for this were that the sampling and randomization took place at the classroom level, and, therefore, the classroom should be the unit of analysis; that the evaluation is primarily concerned with whether the show is useful as a part of the classroom's reading program; and that the initial analysis of variance indicated that differences between classes were greater than differences within classes.

Despite the logical and empirical reasons for these classrooms level analyses, it was also decided to investigate the effects of viewing on individual children from different levels of reading achievement in order to discern which groups of children (rather than which classes) were benefiting from the show. This analysis must be seen as an exploratory look at the data since it ignores the pairing of classes and their randomized assignment to treatment.

An analysis was carried out in which children in each [illegible] in each grade were classified into ten equal groups (deciles) according to pretest Metropolitan scores. Of course, the poorer reading classrooms contributed disproportionately many members to the lower deciles and the better reading classrooms contributed disproportionately more members to the upper deciles. Note that in deciding on the cutting point on the

Metropolitan, both sites were combined. Thus the range of scores encompassed by each decile is the same for both sites and the results for each site can be properly compared.

Tables 42a-d present the data separately by grade for each site. For each grade the number of viewing and non-viewing children in each decile is indicated along with their mean pretest score on the Metropolitan, their mean pretest total score on The Electric Battery, and their mean gain (or post-test score for first grade) on this latter test (along with the respective standard deviations). The critical comparison in each grade and each site is between the gains of the viewers and the gains of the non-viewers (except in first grade where posttest scores are compared).

Results for all four grades reinforce previous analyses that showed effects of the show on viewing classes. In 75 of the 80 decile groups (ten deciles, four grades, two sites), viewers gained more (or had a higher posttest score) than non-viewers. Results in all deciles in all grades seem to be fairly consistent and indicate positive effects from viewing even when the size of the effects do not reach the .10 level of significance. The one exception to this might be in decile 1 in all grades where children on the Metropolitan pretest are scoring at or below chance level and where effects due to viewing seem to be minimal.

There do seem to be some grade and site differences. In first grade the sites differed in that the show seemed to

have the most effect with the poorer readers (lower deciles) in Fresno and the better readers (higher deciles) in Youngstown. In second grade the lower and middle deciles benefited most in both sites. In general, the target groups (mainly those in deciles 1 through 6) seem to be benefited more than the non-target groups. The third grade decile analysis shows significant results spotted across deciles. The fourth grade decile analysis replicates the original analyses on fourth grade and seems to indicate the non-target fourth graders benefiting more than the target children.

In order to see where the show is having effects using gains on the Metropolitan as the dependent variable (as opposed to gains on the Electric Battery total), a second set of decile analyses were run and are here reported. (See Tables 42e and f). The class-level analyses indicated that significant gains were made on the Metropolitan by viewers in comparison to non-viewers only for first grade classes in Youngstown. This less precise but more detailed set of analyses will examine the differential Metropolitan posttest scores of viewers and non-viewers. Only results for first and second graders will be presented.

In first grade in Fresno where the overall analysis showed no significant effect of the show on the Metropolitan, three of the ten decile comparisons were significant (deciles 2, 3 and 10 at the .05 level). In seven of the ten deciles,

viewers had higher Metropolitan scores at posttest than non-viewers (at pretest the figures were two out of the ten). It is interesting to note that the three significant deciles (2, 3, and 10) overlap consistently the four deciles when the total score on the Electric Battery was the dependent variable. That is, effects of the show, assessed by the Electric Battery, seen to generalize to the Metropolitan.

In first grade in Youngstown there was even stronger evidence that children who viewed the show gained with respect to Metropolitan scores (deciles 2, 3, 6, 7, 8, 9, 10 showed varying levels of significant, positive benefit). At every decile the viewers had higher posttest scores on the Metropolitan than the non-viewers. At pretest this was true in only 5 out of the 10 deciles.

The second grade decile analysis of the Fresno data also provides evidence of significant effects on the Metropolitan. Three of the ten comparisons were significant (deciles 6, 7, and 8) and every decile showed viewers with a higher posttest mean Metropolitan score than the non-viewers. A smaller positive effect was note in the second grade decile analysis of Youngstown children.

These analyses look at achievement level at pretest in relation to benefit from viewing. It seems that there is evidence that the show is benefiting not only classes but also certain children at different levels of reading achieve-

ment. There is also evidence that a small but generally pervasive benefit is accuring to scores on a standardized, normed reading test -- the Metropolitan.

b. Intercorrelations

Many variables were assessed in this study because it was thought they might be related to the gains resulting from classes' viewing the show. These variables were regarded as potentially moderating the effects of the show and they included:

1. Years of education
2. Number of children in class
3. Years of teaching experience
4. Percent of time spent on teaching blending
5. Percent of time spent on teaching letter groups
6. Percent of time spent on teaching sight words
7. Percent of time spent on teaching scanning
8. Percent of time spent on teaching morphemes
9. Percent of time spent on teaching syntax
10. Percent of time spent on teaching punctuation
11. Percent of time spent on teaching context clues
12. Teacher questionnaire indices
13. Absentee rates
14. Parent questionnaire scales

In order to see if these moderator variables were related to the classes' gain scores, correlations between the variables and gain scores (with pretest scores partialed out) were

calculated separately for viewing and non-viewing classes. If the variables were, in fact, a moderating influence on gains due to viewing, then the partial correlations between them and the gain score should be significantly different for viewing in contrast to non-viewing classes. For example, if time spent on teaching phonics in second grade were to have a moderating, beneficial effect on gains due to viewing The Electric Company, then the correlation between time spent on teaching phonics and gains (pretest partialled out) should be higher for the viewing classes than for the non-viewing classes.

A series of contrasts (viewing minus non-viewing correlations) were carried out to check on the variables listed above. In fact, only about five percent of the contrasts were found to be significant at the .05 level and none seemed to be consistent across grades or sites or consonant with theoretical expectations. It was concluded that none of the variables studied seemed to have a strong and consistent relationship with gains to be derived from viewing the show in school.

D. Analyses of the At-home Viewing Experiments

1. An Overview

The results presented in this section of the report concern the two sites of Richmond, Virginia, and Washington, D.C. In both sites pairs of classes in grades one through four were chosen and one member of each pair was randomly assigned to the experimental treatment -- encouragement by teachers to view The Electric Company at home after school. The numbers of classes and of children involved in each site and some demographic information have been presented earlier in this report (see Table 12).

Table 43 presents a break out of the demographic data by experimental (encouraged to view at home) and control (not so encouraged) treatments in each site. In each site the characteristics of the encouraged and not-encouraged groups are very similar on virtually every tabulated categorization.

A comparison of the sites themselves reveals some differences. Considerably more pairs of classes were lost to the experiment in Washington than in Richmond (eight pairs to one pair respectively). The loss of classes in Washington was due to the decision in one school to introduce [illegible] viewing to both encouraged and not-encouraged classes. As well, the attrition from pretest to posttest was greater in Washington, primarily in one school that was located near an air force base where personnel with school children were relocated and in another two schools that were located near some public housing that was closed down during the year. Thus, the number of children in the study (both pretested and posttested) is 2287 in Richmond and 1648 in Washington.

The sample in both sites has a preponderance of black children; this is overwhelmingly so in Washington where over 97 1/2 percent of the sample is black (all but 29 children). Almost all the children in both sites had an English language background.

Target children heavily predominate in both sites. All first graders are by definition target children; in second grade where a target child is defined as being in the bottom half of the population in reading achievement on national norms, there are almost four times as many target as non-target children. In third and fourth grades, target children (lowest quarter in reading achievement on national norms) predominate over non-target children by almost three to one. Site differences clearly emerge here, however, with the sampled children in Washington having a greater percentage of target children in third and fourth grades. Note that the samples are not representative of the school systems from which they were taken. A deliberate policy was established of looking for schools and classes within each site where target children were predominant.

The experimental treatment of home viewing was carried out by encouragement of children to view. The thesis of the experiment was that the first major impact of encouragement to view would be greater viewing and the impact of greater viewing would be greater improvement in several areas of reading achievement and attitudes to reading. Thus, actual viewing can be thought of as a dependent variable in a two-phase experiment. If encouragement to view did not produce greater viewing of The Electric Company, then an

examination of the data by this treatment would probably not reveal the effects of viewing.

Evidence about the amount of viewing that occurred is available from the two measures of viewing used in the evaluation. Tables 44a and 44b present the information on the children's viewing of The Electric Company obtained from the posttest parent questionnaires in Richmond and Washington respectively. Embedded in the posttest parent questionnaire were questions on whether the child ever watches The Electric Company, how often, how much of each show, and whether the parent watches too. Unfortunately, the response rates for the posttest parent questionnaire were rather low, especially in Washington.

Percentage of Parents Responding to Posttest Parent Questionnaire

	Richmond		Washington	
Grade	Encouraged	Not-encouraged	Encouraged	Not-encouraged
1	71%	43%	50%	46%
2	60	61	49	46
3	74	75	29	36
4	50	50	42	32

The response rates are, in general, similar for encouraged and not-encouraged classes in each site (except in Richmond grade one). However, well over half of the Washington parents and about one-third of the Richmond parents did not return posttest questionnaires.

Evidence about the amount of viewing of The Electric Company is also available from the viewing records. As these were collected from the children themselves several times during the year in their classes, response rates were considerably higher than those from the parent questionnaires.

Mean Percentage of Children within Classes for Whom at least one Viewing Record was Obtained

	Richmond		Washington	
Grade	Encouraged	Not-encouraged	Encouraged	Not-encouraged
1	99.5%	98.6%	45%	82%
2	97.0	98.4	64	69
3	98.5	100.0	37	47
4	98.5	99.6	82	54

In Richmond, at least one viewing record was obtained from virtually every child. In Washington, 24 classes had no viewing records so then the average return per class is substantially lower than in Richmond and varies considerably from grade to grade.

The following abstract from Tables 44a and 44b lists the percentage of responding parents who indicated that their children viewed The Electric Company.

Percent of Responding Parents Indicating Children Viewed

	Richmond		Washington	
Grade	Encouraged	Not-encouraged	Encouraged	Not-encouraged
1	66%	58%	40%	25%
2	62	49	39	36
3	69	43	39	44
4	66	42	52	38

In Richmond the responses indicate that differences in amount of viewing between encouraged and not-encouraged classes were present -- but were not large. In first grade the difference is quite small (eight percent) but rises to over 20 percent in grades three and four. In Washington the levels of viewing in all grades were lower than in Richmond. Note that differences in viewing rate of the encouraged children is substantially different from that of the not-encouraged children in only two grades -- first (15 percent) and fourth (14 percent). In the second and third grades, encouragement seems to have had no appreciable effect on viewing, the not-encouraged in third grade actually viewing more than the encouraged.

The preceeding data are based on responses to a questionnaire where much data were missing. The rate of responses for viewing records was much higher, especially in Richmond. For each child with at least one viewing record, a view score was devised by dividing the number of times the child said he had watched The Electric Company by the number of viewing records collected. Thus view scores ranged from 0 (never said he watched) to 1 (always said he watched). Viewing record scores of each class were calculated by averaging the children's scores. The following table represents the mean class viewing record scores for each grade in Richmond and Washington:

Mean Class Viewing Record Scores

	Richmond[1]					Washington				
	Encouraged		Not Encouraged		# of	Encouraged		# of	Not Encouraged	
Grade	M	SD	M	SD	classes	M	SD	classes	M	SD
1	.76	.08	.69	.10	4	.51	.30	7	.53	.18
2	.69	.17	.61	.12	12	.64	.15	12	.55	.24
3	.70	.18	.56	.05	5	.43	.28	5	.64	.25
4	.56	.16	.45	.17	8	.40	.18	7	.33	.22

[1]All Richmond classes included in these scores.

As with the parent questionnaire responses, the viewing record scores indicate small differences between the amount of viewing of encouraged classes and the not-encouraged classes. In Richmond, the amount of viewing reported by children in encouraged classes is greater than the amount reported by not-encouraged classes in every grade, but this difference is small, ranging form .07 in first grade to .14 in third grade. In Washington, differences are even smaller, and once again the third grade not-encouraged classes reported more viewing than the encouraged classes.

Evidence about amount of viewing of the The Electric Company is based on incomplete sets of data. While the effects of the missing data on these analyses is not calculable, it appears from both sources that there was little difference in the amount of viewing that took place in encouraged and not encouraged classes. In effect, the experiment failed and while analyses of data by encouragement will tell little about the effects of viewing, these analyses will be presented for the purpose of comprehensive reporting. Later manipulations of the data will be presented that attempt to discover effects of viewing.

An overview of the results of the at-home viewing experiment is here presented in Abstract VI. These results are based on data from The Electric Battery test of 123 items (except for the pretest in first grade where only 24 items were administered).

It can be seen that again the decision was made to keep grades and sites separate. This decision was made in order to keep the analyses and reporting of the at-home and in-school experiments consistent and to overcome the problems that emerged when it was found that amount of viewing was distinctly different in Richmond and Washington and that differences in pretest levels of performance existed between Richmond and Washington (favoring Richmond in first and fourth grades and Washington in second grade). As well, in Richmond the classes constituting the sample in one grade came from a substantially different set of schools than the classes constituting the sample in a different grade. Clearly, collapsing data across grades in Richmond would present problems.

The pretest results indicate that in both sites at each grade level the randomization process had the desired effect of obtaining reasonably comparable encouraged and not-encouraged classes. The largest difference at pretest between encouraged and not-encouraged classes is 2.8 points (third grade in Richmond). Five of the eight pretest contrasts favor the encouraged groups and three favor the not-encouraged. Also presented in Abstract VI are posttest, gain, and the difference between the adjusted gain scores of encouraged and not-encouraged pairs of classes and their respective standard errors.

	Richland				Washington			
	Pretest	Posttest	Gain	Adjusted Variable	Pretest	Posttest	Gain	Adjusted Variable
		N=10 pairs		Grade 1 *		N=8 pairs		
Encouraged	16.4	75.2	59.2		13.1	66.9	53.8	
Not-encouraged	15.9	72.6	56.7		13.3	66.5	53.2	
Encouraged minus Not-enc.	0.5	2.9	2.4	1.4	-0.3	0.4	0.6	-1.5
SE of Estimate	0.7	3.2	2.7	2.6	0.7	5.8	6.4	3.5
		N=20 pairs		Grade 2		N=16 pairs		
Encouraged	64.7	89.1	24.4		71.2	84.0	12.8	
Not-encouraged	67.2	88.3	21.1		72.0	88.1	16.0	
Encouraged minus Not-enc.	-2.5	0.8	3.4	2.6	-0.8	-4.1	-3.3	-3.8
SE of Estimate	1.4	1.9	1.6	1.8	2.1	2.3	2.7	2.4
		N=9 pairs		Grade 3		N=9 pairs		
Encouraged	89.3	99.9	10.7		89.3	101.2	11.9	
Not-encouraged	86.5	97.2	10.7		89.1	99.6	10.5	
Encouraged minus Not-enc.	2.8	2.7	-0.1	0.9	0.2	1.6	1.4	1.5
SE of Estimate	2.4	1.8	1.2	1.1	1.6	1.9	2.0	2.0
		N=10 pairs		Grade 4		N=10 pairs		
Encouraged	101.7	107.0	5.2		93.1	104.1	6.0	
Not-encouraged	99.5	105.7	6.2		95.7	102.2	6.6	
Encouraged minus Not-enc.	2.2	1.2	-1.0	-0.7	2.4	1.9	-0.5	1.6
SE of Estimate	1.3	1.5	1.0	1.2	1.1	1.2	1.6	1.7

*24-item pretest

At posttest the encouraged classes performed at a higher level than the not-encouraged classes in seven out of the eight experiments. The exception was in second grade in Washington. However, after adjusting for pretest, the difference between the gains of the encouraged and not-encouraged classes favored the encouraged in only five experiments (first, second, and third grades in Richmond and third and fourth grades in Washington). None of these adjusted differences is statistically significant.

These results are in strong contrast to those obtained from the in-school viewing study where every one of the eight adjusted gain scores significantly favored the viewing classes. It is important for the overall evaluation that possible reasons for the different results be discussed.

One important reason is clearly the effectiveness of the experimental manipulation -- encouragement to view the show. For the in-school viewing experiment all experimental classes viewed the vast majority of the shows. For the at-home viewing experiment the data on viewing already presented indicate that encouragement resulted in very small differences in amount of viewing between encouraged and not-encouraged classes.

The question of why the extra learning did not take place seems clearly bound up in the fact that there was very little extra viewing, and this can be accounted for in a number of ways. Consider a hypothetical pair of second grade classes, one class randomly assigned to be encouraged to view and the other not to be so

encouraged. The figures indicate that within the not-encouraged classes in Richmond about 50 percent will view anyway of their own or their parent's volition. Presumably about the same percentage in the encouraged class would also have viewed anyway. Thus, the encouragement is presumably directed towards the other 50 percent of the encouraged class. Some of those children may not want to watch television at the time of the late afternoon showing of The Electric Company -- perhaps they are playing or working at some hobby. Others may want to watch but their television cannot receive the UHF channel transmitting the show. Still others might be susceptible to the encouragement and have a set capable of receiving the show, but older siblings or parents want to watch some other show. Those who are left -- those who can and may view the show at home and who are susceptible to the encouragement -- represent the differential over the viewers in the not-encouraged classes. If the show had been less popular (say only 10 percent of the not-encouraged had viewed) the differential would probably have been larger. In addition, some teachers reported that they discontinued encouragement when they discovered that substantial numbers of children could not see the show because of reception difficulties. Encouragement was not an all or nothing treatment.

Another possibility exists. The kind of viewing that occurs at home may be less directed at the goal elements and less followed up and further reinforced than the kind of viewing that occurs in school. This possibility will be further discussed

when analyses of these data based on amount of viewing are presented later in this chapter.

It is further possible that the failure to obtain positive results with classes analyzed as a whole clouded a significant finding if classes were split into target and non-target components. As in the in-school experiment, classes were divided into these two components. In no case did encouragement have a significant effect upon total score. An abstract of the results by target and non-target components is not presented here but the relevant tables in Volume 2 of this report will be listed and described in the following section.

2. Analyses of the At-home Viewing Experiment by Grade

Although the overview presented in the previous section of this chapter showed no significant results were obtained in this study, it is still proper and relevant to present the results in some detail. In order to obtain a picture of the specific effects of The Electric Company on first through fourth grade classes who were encouraged to view the show at home, the following tables will be examined:

--Tables 45a and 45b which present the pretest, posttest, and adjusted scores for encouraged and not-encouraged first grade classes in Richmond (45a) and Washington (45b).

--Tables 46a and 46b which present the pretest, gain, and adjusted scores for encouraged and not-encouraged second grade classes in Richmond (45a) and Washington (45b).

--Table 47 which presents the pretest, gain, and adjusted scores for target and non-target components of encouraged and not-encouraged second grade classes in Richmond.

--Tables 48a and 48b which present the pretest, gain, and adjusted scores for encouraged and not-encouraged third grade classes in Richmond.

--Tables 49a and 49b which present the pretest, gain, and adjusted scores for target and non-target components of encouraged and not-encouraged third grade classes in Richmond (49a) and Washington (49b).

--Tables 50a and 50b which present the pretest, gain, and adjusted scores for encouraged and not-encouraged fourth grade classes in Richmond (50a) and Washington (50b).

--Tables 51a and 51b which present the pretest, gain, and adjusted scores for target and non-target components of encouraged and not-encouraged fourth grade classes in Richmond (51a) and Washington (51b).

--Tables 52a through 52h which present the pretest and posttest teacher questionnaire scales and selected items for encouraged and not-encouraged classes in grades one through four in Richmond (52a-d) and Washington (52e-h).

--Tables 53a through 53h which present the results of observations of reading lessons in first through fourth grade encouraged classes in Richmond (53a-d) and Washington (53e-h).

--Tables 54a and 54b which present the pretest and posttest parent questionnaire scale scores for encouraged and not-encouraged children in grades one through four in Richmond (54a) and Washington (54b).

First Grade

The data for this experiment are based upon ten pairs of classes in Richmond and eight pairs in Washington. The pretest scores in the two sites were substantially different. Note too that the amount of viewing of [illegible] was considerably lower in both encouraged and not-encouraged classes in Washington than in Richmond. Of all the statistical contrasts carried out on the tests and subtests, only one was significant. Because an occasional significant result can be expected by chance when multiple contrasts are made, this result was not considered meaningful.

The average number of children who were both pretested and post-tested per class was quite different for the two sites. In Richmond the average was about 22 children per class; in Washington it was between 17 and 18. This reflects the large attrition rates in three Washington schools.

Observations of the encouraged classes indicated a somewhat greater emphasis on phonics in Richmond than in Washington; but this does not seem to be particularly relevant information for this evaluation since neither site provided evidence of significant experimental gains. Similarly although the parent questionnaires indicated somewhat greater affluence among Richmond parents compared with the Washington sample, no side-effects of the experimental treatment could be discerned.

Second Grade

The data for this experiment are based on 20 pairs of classes in Richmond and 16 pairs in Washington. In Richmond there was some evidence of positive effects of the show. The adjusted differences in gains for the grand total score, individual total score, and blending total were significant at the .10 level. The effect seemed to be clearest with sight words and context vocabulary. These results have a logic to them in that these two subtests assess a similar reading skill. When the target and non-target components were broken out this small effect remained for the grand total.

It should be emphasized that the results of this study are conservative and that failure to obtain strong significant results in this analysis does not mean the show is ineffective for those who

view -- merely that encouragement to view produces a relatively weak enhancement of the amount of viewing and, in turn, produces few measured effects.

In Washington, the second grade experiment was the only one of the sixteen conducted for the evaluation in which the not-encouraged classes had a higher mean posttest score than the encouraged classes. An investigation of the pretest, posttest, and gain scores for each of the individual second grade classrooms revealed three in which the mean scores decreased from pretest to posttest. While errors of measurement might account for subjects at the extremes of the test score range having a lower posttest than pretest score, for three classes to move backwards and for all of them to be in one of the 16 experiments (four grades by four sites) is a highly improbable occurrence. It was noted that each of the three classes was posttested by a tester who, after discussion with the coordinator, had quit her job midway through the posttesting. We felt it would be improper to omit classes selectively from our data so all data collected are here reported. However, these second grade Washington results are presented without great confidence in their validity. It should also be noted that even if the three classes which had negative gains were excluded from the data analyses, the overall conclusion of non-significance would remain.

Third and Fourth Grades

It is, perhaps, not surprising that no positive results were obtained in the third and fourth grade at-home viewing experiments. Even in the in-school viewing study, where all experimental classes viewed and control classes did not, the results, though statistically

significant, did not show large differences between the two groups of classes. In the at-home viewing study the difference in amount of viewing between encouraged and not-encouraged classes was quite small. Thus, one would expect, at best, only small differences in their respective gains. In fact only small differences were observed and none was significant.

Teacher Questionnaire Results

A number of variables to be considered in relation to the results of the at-home viewing study is to be found in the teacher questionnaires (Tables 52a-h). Completed questionnaires were obtained from all Richmond teachers at pretest and at posttest. In Washington, all teachers completed their posttest questionnaires but the number of completed pretest questonnaires was considerably less.

Since positive results were not obtained in the at-home viewing experiments one might speculate whether positive results were hidden by some kind of negative interaction between the regular reading program and the books used in class on the one hand and The Electric Company on the other.

In Richmond all teachers used the same reading texts (the Lippincott Basic Readers) in first through third grades. While there was some diversity in fourth grade the series used in the earlier grades still predominated. In Washington there was greater variety in the texts used, though for first grade the Bank Street Readers were most popular. Neither these books not the eclectic-phonic approach to teaching noted from the classroom observations seemed particularly different in emphasis than those noted in the at-home viewing experiment where

positive results were obtained. Thus, it was felt that there was little to be gained from further scrutiny of these data.

Many teachers in our Richmond and Washington samples watched The Electric Company at-home after school and their attitudes toward the show seemed very positive -- if anything slightly more so than the attitudes expressed by the Fresno and Youngstown teachers. Many felt that the show should be seen in school and this opinion was most strongly expressed by teachers who knew that the UHF transmission prevented some of their pupils from viewing at home.

3. Analyses of the At-home Viewing Experiment by Viewing Groups

Throughout the results chapter to this point the data from this evaluation have been analyzed and presented in terms of the experimental design which involved paired classrooms and random allocation of pair members to treatment or control conditions. The results obtained from these "true" experiments can be interpreted with relative ease in that many potential alternative hypotheses and explanations for results are precluded by this kind of design.

However, with the at-home viewing experiment it was seen that the amount of treatment (viewing) was not radically different for the experimental in comparison to the control classes. That is, both groups of classes viewed The Electric Company at home and the differences in their amount of viewing were not great. Therefore, it was decided to analyze the data in quasi-experimental ways in order to attempt to extricate the effects of viewing and of encouragement to view.

Amount of viewing is a difficult variable to assess in large field experiments. Even if the experiment had been confined to a few children the best technology for assessing amount of viewing of a particular show would have provided an expensive and still imperfect measure. In our extensive study of more than 4,000 children from some 200 classrooms it was not possible to install meters on home sets or to arrange for other forms of checking on viewing. Instead, as presented in the previous chapter, amount of viewing was assessed with two different instruments -- in the

posttest parent questionnaire where parents were asked a series of questions about their children's viewing of The Electric Company; and in the viewing records where children in their classes were asked on a number of occasions during the school year to indicate, from a selection of popular television shows, which ones they viewed.

Note that not all posttest parent questionnaires were returned, not all children were present when the viewing records were being collected, and not all classes were cooperative in filling out viewing records. Amount of viewing was assessed by either or both methods for the following numbers of children:

	Richmond		Washington	
	No. of subjects in total sample	No. with viewing measure	No. of subjects in total sample	No. with viewing measure
Grade 1	452	452	287	233
Grade 2	938	924	629	501
Grade 3	410	407	342	193
Grade 4	487	482	390	290

In Richmond 22 subjects had no viewing measure and in Washington 431 had none. Those with at least one viewing measure were assigned to groups on the following bases: Non-viewers (NV) were children who had a completed parent questionnaire and/or viewing record score indicating that the child had not viewed the show. Group 1 viewers (presumably about 1/4 of the shows were viewed) were so categorized if they met these conditions --

Parent Questionnaire Score		Viewing Record Score
5	and	0 or blank
0-4	and/or	.25
0-3	and	.33
1	and	.5

Group 2 viewers (presumably about half the shows were viewed) were so categorized if they met these conditions --

6	and	.25-.50
5	and	.25-1
0-4	and	.33-1
blank	and	.5

Group 3 viewers (presumably about 3/4 of the shows were viewed) were so categorized if they met these conditions --

7-8	and	.75
6	and	.75-1.0
6	or	.75
8	and	.667

Group 4 viewers (presumably almost all of the shows were viewed) were so categorized if they had a viewing score of 7 or 8 on the parent questionnaire and/or a score of 1.0 on the viewing records.

Table 55 presents the pretest, posttest, and gain scores for each grade by viewing groups separately for children in Richmond and Washington. The scores of encouraged and not-encouraged children are collapsed within each of the viewing groups. It should be remembered that in this examination of the data the viewing

groups are self-selected -- the children and their families decided how much viewing of The Electric Company occurred. The pretest scores of the second most frequent viewing groups (V3) are consistently the highest of all groups (except in third grade in Washington). Apart from the pretest superiority of the V3 group, the pretest scores of the other viewing groups and of the non-viewing group seem quite similar overall. An examination of the posttest and gain scores arrayed in Table 54 suggests no systematically different results in relation to amount of viewing.

Table 56 presents the results of univariate analyses of covariance of these data separately by grade and by site. These analyses attempt to extract the effects of encouragement and of viewing on the posttest scores adjusted for pretest scores. This can be done because there were children in all viewing groups who were encouraged and others who were not-encouraged.

In each of the eight experiments (four grades by two sites) the pretest covariate, as expected, was seen to be significantly related to the posttest score. More importantly for the evaluation, in only one case (Washington, grade 1) was there a viewing by encouragement interaction. This suggests that the relationship between posttest scores and amount of viewing was different for the treatment group. The main effort of viewing, distinct from encouragement, was significant only in Washington, second grade (but the data there have already been discounted) and in Richmond, fourth grade. The main effect of encouragement, distinct from viewing, was significant in both sites for second grade (though

this included the suspect second grade Washington data) and in Washington for third grade. This effect for encouragement says little about the effects of viewing The Electric Company.

The possibility of inaccurate viewing measures causing effects of viewing to become hidden in the preceding analyses led to some further investigation of the viewing measures. For those children who had both viewing measures, correlations between the measures were calculated separately by site and grade and were found to be only moderately correlated in most cases (averaging about .40). Analyses were done using each measure separately to calculate viewing groups, and again the results indicated that viewing (whether measured by viewing records or parent data) did not seem to be related to reading performance.

The evidence for a main effect of viewing or for a main effect of encouragement over the eight experiments is slight. Amount of viewing, as assessed in this study, does not seem to have been a significant factor affecting the reading scores of children in the at-home experiment (irrespective of whether they were encouraged to view or not) nor does encouraging children to view the show seem to have had a significant effect on children's reading scores (irrespective of whether they viewed or not). The at-home viewing study, in contrast to the in-school viewing study, presents few positive results. These different results will be discussed in more detail in the final chapter.

In order to establish whether the results of the viewing group analyses of the at-home viewing experiments held when target chil-

dren only were being considered, analyses were conducted in which non-target children were eliminated from consideration. This did not affect the first grade results as presented because all first graders were regarded as target children. Some modifications might be possible in the results for the other grades, however, although it would be unlikely that the modifications would be radical since target children heavily predominated in the second, third, and fourth grade samples.

Table 57 presents an overview of the pretest and gain scores of target children by viewing groups in second, third, and fourth grades separately for each site. These results seem consonant with those presented in Table 54 when the scores of all sampled children (target and non-target) were presented. That is, amount of viewing, as assessed in this study, does not seem to have been a significant factor affecting the reading scores of target children viewing in their homes.

In summary, the at-home viewing experiment foundered when the encouraged children failed to view the show much more than the not-encouraged children. Thus the results from the true experiment are not interpretable. The results of the subsequent attempts to extract meaningful results were hampered by amount of viewing scores that probably contained a considerable amount of error of measurement. Thus, even if viewing were affecting the scores of the children, the impact on the scores, unless it were a strong impact, might not be discernible. Therefore, while it is true that there seems little evidence from the study

that children gained from viewing The Electric Company at home, it is also true that the at-home viewing study did not operate as effectively as had been planned.

4. Analyses of Attendance Records

In order to see if encouragement to view The Electric Company at home had a positive effect on the attitudes of the viewers, an unobtrusive, non-reactive measure -- the classes' attendance records -- was obtained. The reason for using this measure and the problems associated with its use have already been discussed in relation to the in-school viewing experiments.

The data for the at-home experiments is here presented in tabular form. It can be seen that no systematic or large differences in attendance between the encouraged and the not-encouraged children were found in either site or any grade during the September-October, pre-program period. Similarly, none were found during the November-May program period.

Average Daily Absentee Rates of Encouraged and Not-encouraged Classes in Richmond and Washington

	# of pairs	September and October				November thru May			
		Encouraged		Not-encouraged		Encouraged		Not-encouraged	
		M	SD	M	SD	M	SD	M	SD
Grade 1:									
Richmond	10	4.4%	2.0%	3.9%	1.9%	6.5%	1.9%	5.3%	1.5%
Washington	8	9.9	5.3	8.7	2.5	12.4	4.9	11.6	2.4
Grade 2:									
Richmond	20	4.2	1.8	3.9	1.8	6.4	1.6	6.1	2.4
Washington	16	8.1	2.4	7.8	3.1	11.6	2.6	11.2	3.4
Grade 3:									
Richmond	9	4.3	1.6	4.2	1.5	5.4	1.7	5.4	1.8
Washington	9	8.2	1.4	8.6	2.2	10.7	2.2	11.3	2.2
Grade 4:									
Richmond	10	2.4	1.3	2.7	1.8	5.1	1.1	5.3	1.7
Washington	10	8.1	0.7	7.7	1.9	10.8	1.8	10.8	2.2

As was pointed out in earlier discussions of the at-home viewing experiments, the reported viewing of the children in the encouraged classes was not much more frequent than the viewing of the children in the not-encouraged classes. Thus, one would not reasonably expect the attendance (or any other dependent variable) to be markedly affected by the experimental condition.

CHAPTER IV. SUMMARY and CONCLUSIONS

Summary of Project Activities

In order to discover some major effects of viewing The Electric Company in its first year of telecasting, two experiments were conducted. In one, viewing in school in first through fourth grade classes was studied in Fresno, California and Youngstown, Ohio. In the other experiment viewing at home was studied in Richmond, Virginia and Washington, D.C. also with first through fourth grade classes. Throughout the analyses, sites and grades were kept separate so that the effects of the show could be estimated separately for each of the four grade levels in each of the four sites. The two sites for each of the two experiments served as experimental replications.

The experimental design involved matching pairs of classrooms at each grade level and randomly assigning one member of the pair to the experimental condition and the other member of the pair to the control condition. The experimental treatment for the in-school viewing experiment was to have each class view the show in school daily over a period of six months. The experimental treatment for the at-home viewing experiment was to have the teacher encourage the children to view the show at home after school for a period of six months. In the two in-school viewing sites, the show could only be seen during the school day so that viewing was contingent upon being in an experimental classroom. In the two at-home viewing sites all teachers in the experiment agreed not to show the program in their classrooms. However all children, experimental or control, potentially could view it after school. It was anticipated that a higher proportion of children in encouraged classes would view than in control classes.

In each site the sample was 100 classes (50 pairings) of which 20 classes were from each of first, third, and fourth grades and 40 from second grade. Of primary concern was the effects of the show on "target" children (defined by CTW as all first graders, children in the lower half on national reading norms in second grade, and children in the lowest quartile in third and fourth grade), so that classes with a preponderance of "target" children were initially selected.

Measuring instruments included The Electric Battery, (a reading test developed for the evaluation to assess reading behaviors that were addressed on the show, including knowledge, skills, and attitudes to reading), a normed and standardized reading test, a parent questionnaire (to assess home background conditions, relevant parental attitudes, and television viewing habits), a teacher questionnaire (to assess the teachers' backgrounds, methods of teaching reading, classroom characteristics, and, where appropriate, attitudes to the show), viewing records (to assess how much viewing was taking place), and observation records (to record what reading areas were being taught in the regular reading program of experimental classes and how they were being taught).

The design called for a pretesting before The Electric Company began and a posttesting after the end of the first season of the show six months later. In the interim, observation and attendance records were collected.

B. Summary of the Results

1. The In-School Viewing Experiments

The data from the eight experiments (first through fourth grades separately in each of the two sites -- Fresno and Youngstown) were analyzed by comparing the experimental viewing classes and their control non-viewing pairs. The primary analysis was in terms of the gain scores from pretest to posttest, adjusted for the pretest scores. This analysis was chosen when it was found that this estimate was more precise than estimates using posttest scores or gain scores alone. It was found that the viewing classes had significantly larger adjusted gain scores on the grand total than the non-viewing classes in each of the eight experiments. For the lower grades the differences were larger than those obtained in the higher grades. It was noted that in the higher grades most of the children at pretest were already performing quite well in almost all of the areas measured.

Similar analyses were conducted broken down by target and non-target components of the paired classes. (Note that all first graders were considered target so that the results obtained on the first grade classes are identical with the target components.) In second, third, and fourth grades it was found that both target and non-target components generally benefited significantly from the show though the size of the effect was somewhat lower than when the classes were considered in their entireties. Even so, in only one experiment (Youngstown fourth grade target component) was the effect favoring the viewing classes less than the 90 percent level of confidence.

An examination of the subtest scores for each of the four grades for the in-school viewing experiment can be made through reference to the accompanying tabular presentation (Abstract VII). It shows that all first and target second grade groups seemed to benefit from the show over a wide range of goal areas. There was some evidence that for first grade classes this general effect could be interpreted in terms of learning to read (see, for example, the significant effect on the Metropolitan test in one site and the significant impact over all four tests -- blending, chunking, scanning, and reading for meaning).

For target components in second grade a similar impact was seen. Whether this impact means that a lower proportion of the viewing second grade classes will subsequently need remedial reading programs than their paired non-viewers is a question that is being assessed in a follow-up study.

The non-target second graders seem to have benefited in some areas assessed in the Electric Battery, though the effects were generally not significant. That is, if a second-grade child is in the top half of his grade in terms of national reading norms, few special benefits seem to accrue from watching The Electric Company in class. This may be because the content level of the show -- the skills being taught -- are ones that are already possessed or ones that will be learned in the classroom under regular reading instruction, or because the measures used in this evaluation did not tap areas that were benefitting non-target second graders.

Abstract VII

Overview of Significance Levels of Tests and Subtests for the In-school Experiments in Fresno (F) and Youngstown (Y)

Test and Subtest	No. of Items	Grade 1 Total F	Grade 1 Total Y	Grade 2 Total F	Grade 2 Total Y	Grade 2 Target F	Grade 2 Target Y	Grade 2 Non-Target F	Grade 2 Non-Target Y	Grade 3 Total F	Grade 3 Total Y	Grade 3 Target F	Grade 3 Target Y	Grade 3 Non-Target F	Grade 3 Non-Target Y	Grade 4 Total F	Grade 4 Total Y	Grade 4 Target F	Grade 4 Target Y	Grade 4 Non-Target F	Grade 4 Non-Target Y
Matching Words	8	-	*	**	-	**	-	-	-	-	-	-	-	**	-	-	-	-	-	-	*
Consonants	13	**	***	**	-	**	-	-	-	-	-	-	-	-	*	-	-	-	-	-	-
Vowels	6	**	**	-	-	-	-	X	-	-	-	-	-	-	-	-	*	-	*	*	*
Consonant Blends	9	-	***	*	*	**	*	-	-	-	***	-	**	-	-	-	-	-	-	-	-
Blending Total	28	*	***	*	-	**	-	*	-	-	*	-	-	-	***	-	-	*	-	-	-
Vowel Combinations	9	**	***	***	-	***	-	-	*	-	*	-	-	*	*	*	-	**	-	-	**
Consonant Digraphs	6	***	***	***	***	***	***	*	-	**	***	***	***	-	-	**	-	**	-	*	-
Controlled Vowels	4	-	-	***	-	***	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Larger Spelling Patterns	5	**	**	***	-	***	-	-	-	-	***	-	**	-	-	**	*	**	-	*	**
Sight Words	4	-	***	**	**	**	***	-	-	-	*	-	-	-	**	-	-	*	-	-	**
Chunking Total	28	***	***	***	*	***	-	*	-	*	**	**	**	-	-	**	-	**	-	*	**
Final E	6	***	**	***	***	***	**	**	-	**	*	**	-	-	**	**	*	**	-	*	*
Double Consonants	4	-	***	***	*	**	*	-	-	*	-	-	-	*	-	-	**	-	*	**	*
Open Syllables	4	*	*	**	-	**	-	-	-	*	-	-	-	-	*	-	-	-	-	*	-
Scanning Total	14	**	***	***	*	***	*	-	-	**	*	***	-	**	**	**	**	**	**	**	**
Morphemes	10	-	***	***	**	***	**	-	-	-	-	-	-	-	***	-	**	-	X	-	***
Linear Blending	6	**	***	*	***	**	***	-	-	-	-	-	-	-	-	-	-	-	X	-	-
Syntactic Units	7	-	***	***	***	***	***	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Punctuation	5	*	**	-	-	-	-	-	-	-	-	-	-	-	-	**	**	**	**	**	**
Context Total	9	-	***	***	**	***	***	-	-	**	-	**	-	-	-	-	-	-	-	-	-
Context Vocabulary	4	*	***	***	**	***	**	-	-	-	-	-	-	-	-	-	-	-	-	-	X
Context Sentences	4	*	***	-	**	**	**	-	-	-	-	-	-	*	*	-	-	-	-	-	**
Sentence Questions	8	-	***	*	**	*	**	-	*	-	**	-	**	**	-	-	-	-	-	-	-
Reading for Meaning Total	45	*	***	**	***	**	***	-	*	*	**	*	-	*	**	-	**	-	-	-	***
Grand Total	123	**	***	***	**	***	**	**	*	**	**	**	*	*	***	**	**	**	-	***	**
Show Specific Items	32	**	***	***	***	***	***	**	-	*	**	*	-	-	***	***	***	**	*	-	**
Non-show Specific Items	32	**	***	***	*	**	**	**	**	**	**	**	-	-	**	**	-	**	-	**	-
Left-right Orientation	2	-	-	-	-	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scrambled Sentences	4	-	***	***	*	**	-	-	-	-	**	-	*	-	-	*	-	**	-	-	-
Individual Test Total	36	-	***	***	*	**	-	**	-	-	*	-	-	***	-	**	-	-	-	-	-
Attitude:																					
Attitude to School	9	-	**	-	-	-	-	-	-	-	-	-	-	-	-	-	*	-	-	X	**
Reading Preference	4	**	-	-	-	-	XX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Math Preference	4	-	**	-	-	-	**	-	-	-	-	-	-	-	-	*	**	*	-	*	*
Social Studies Preference	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X*	-	XX	-	-
Art Preference	4	-	-	-	-	-	-	-	-	-	-	X	-	-	XX	-	-	-	-	-	-
Spelling Preference	4	-	-	XX	XX	XX	-	-	**	-	*	-	-	-	-	-	-	-	**	-	-
Metropolitan Achievement	---	-	*	-	-	-	-	-	-	-	-	-	-	-	-	*	-	**	-	-	-

Significant in favor of viewing class:
- = not significant
* = significant at .10 level
** = significant at .05 level
*** = significant at .01 level

Significant results were obtained for target components in third and fourth grade in several goal areas. The blending area measured already seemed mastered even by target third and fourth graders; some impact in the chunking area can be seen (specifically, consonant digraphs and larger spelling patterns). The final "e" in scanning was positively affected; and punctuation (fourth grade) in the reading for meaning area also was positively affected. These benefits were coupled with slight but pervasive benefits that accrued over other goals to yield significant results for the grand total. Whether this will provide "a remedial effect" is an open question at this point. Since no negative side-effects were noted, it would seem reasonable to look further at third and fourth grade classes to discover the long term effects but, to our knowledge, this is not being done.

Non-target third and fourth graders seemed to benefit about as much from the show as their target counterparts. However, there was little consistency between sites except in the scanning area (final e and double consonants). Again, a slight but pervasive effect accrued over many subtests to provide significant results on the total test score.

As well as the results from the skills and knowledge sections of The Electric Battery, data were collected on the children's attitudes to school and to reading. The results did not indicate any systematic effects. Similarly, teachers' attitudes to and opinions about their classes in relation to reading seemed not to be affected.

Teachers who were in the in-school viewing experiment and who did use the show in their classroom work generally favored the show though some teachers would have preferred not to use it or to use it less than once a day.

Perhaps in keeping with the eclectic approach to reading instruction used by The Electric Company, teachers were not apparently influenced by the show to teach reading differently from the methods they usually used. Most teachers, it was noted, already used an eclectic approach to teaching reading.

Teachers recognized that the show had different uses for children from differing grades. Thus, teachers in third and fourth grade thought the show useful for reviewing letter sounds and word attack skills whereas teachers in first grade saw the show as being useful for teaching skills to the children.

An investigation was carried out to determine whether The Electric Company was displacing or adding to the time normally spent on reading instruction. Great variability among classes in time spent on reading, as reported by teachers, was noted. However, as is to be expected, less time was spent in the higher grades and no systematic differences were noted between experimental and control classes at pretest. Some experimental classes did add to the amount of time spent on reading by having The Electric Company displace time from subject areas other than reading. However, the results of a comparison of the first grade viewing classes in Fresno and Youngstown that did add to the time spent on reading, and those that did not add time showed that

additional time did not seem to be in itself an important factor in the gains made by the viewing classes.

Parents, too, were used as sources of information for the evaluation. In the in-school viewing experiments, parents reported no differences in the reading habits of their children out of school. The show had no apparent side-effects on parents generally, except that parents of viewing first graders seemed to think their children were doing better in reading than did parents of control first graders.

Within the in-school viewing sample were large numbers of Spanish-background children (in Fresno) and black children (in Youngstown). In both sites there were also large numbers of white, English-speaking children. Analyses were conducted to see if the data from these three groups of children looked at separately paralled the results of the sample as a whole -- that is did Spanish-background children (or black, or white) who viewed in school gain from the show as compared with their non-viewing counterparts? The results indicated that the benefit did indeed occur across all three population groups.

Similarly boys who viewed were compared with non-viewing boys and girls with non-viewing girls. (Each class in the study had a boy component and a girl component and it was the class that constituted the level at which this analysis -- and the preceeding ethnic-language analyses -- was carried out.) Boys tended to have lower scores in reading at pretest. It was found that both boys and girls seemed to benefit in all four grades but

the size of the effects was greater for girls in first and fourth grades and for boys in second and third grades.

Another question that was explored was whether black and white or color television reception had a differential effect on the learning of the viewers. In Youngstown in each grade the two kinds of receivers were randomly placed among the viewing classes. The results seemed to indicate that the color television sets did not mediate greater learning among the viewers. Classes viewing on black and white sets slightly outgained those viewing on color sets in first, second, and fourth grades. No data were analyzed to see if the emotional-affective domain was influenced by the kind of television reception.

As well as these analyses of class data in the in-school viewing experiments, some probing analyses were conducted on the effect of viewing using children and not classes as the units of analyses. Viewing and non-viewing children in each site in each grade were classified into ten equal groups (deciles) by level of reading achievement as measured by pretest Metropolitan scores. Results for all four grades reinforced previous analyses (summarized above). In 75 of the 80 decile groups (ten deciles, four grades, two sites) viewers gained more than non-viewers on the Electric Battery. The major systematic exception was in the lowest decile in all grades. Here the pretest scores were at or below chance level and effects of viewing were not apparent.

Gains on the Metropolitan were also used as a dependent variable for decile analyses in first and second grades. It was found that,

for both grades in both sites, the effects of viewing the show did include improvement in Metropolitan scores in some decile groups.

A final probing analysis involved the intercorrelation of a number of teacher and class variables with posttest total score (partialing out pretest score). In order to see if these variables had moderating effects on viewing, the intercorrelations were calculated separately for viewing and non-viewing classes and the results compared. No systematic, significant results were found.

2. The At-Home Viewing Experiments

The data from the eight experiments (first through fourth grades separately in each of the two sites -- Richmond and Washington) were analyzed by comparing the experimental (encouraged to view at home) classes and their control (not-encouraged) classes.

Evidence on the amount of home viewing was collected from parent questionnaires and from viewing records filled in by the children. Data from these measures indicated that children in the encouraged classes did not view The Electric Company to a substantially greater degree than the children in the control classes. Thus, it was not surprising to find that there were no significant results in any grade in any site when the adjusted gains of the experimental classes were compared with those of the control classes. This was also the case when target and non-target components of the classes were subjected to separate analyses.

In an attempt to extricate whether viewing at home had an effect on reading scores, analyses of covariance were also conducted at the individual child level. Amount of viewing (five levels) and the encouraged or not-encouraged condition were entered into the analyses. In general these analyses of the data provided little evidence for a beneficial effect of viewing The Electric Company at home, although these analyses were based on viewing measures that apparently contained a substantial amount of error.

Teachers in these at-home viewing experiments held, in general, positive views of the show and many expressed a wish to use the show as part of their in-school curriculum. No other major side-effects of the at-home viewing experiments were noted.

C. Conclusions

In order to present systematically the major conclusions to be drawn from the results, the questions that the study was designed to answer will again be posed and conclusions drawn.

1. What are the effects of viewing The Electric Company in school on first to fourth grade classes? What are the effects of viewing in school on second grade children who score in the lower half of their grade on normed reading achievement tests? What are the effects of viewing in school on third and fourth grade children who score in the bottom quartile on normed reading achievement tests?

The experiments conducted to assess the effects of in-school viewing indicated that significant positive effects occurred in all four grades. The size of the effect appeared to be greatest in first and second grades and the effect was generalized across goal areas. Third and fourth graders had smaller absolute gains from the show. This was due primarily to the fact that at pretest these children already knew much of the curriculum measured by the tests. Since they gained significantly from the show (in comparison with their non-viewing counterparts) it would seem that they benefited from the relatively small part of the tested curriculum that was appropriate to their level of achievement in reading.

Target second graders (children scoring in the lower half of their grade on normed reading tests) benefited from the show in most goal areas. Target third and fourth graders (lowest quarter of their respective grades on normed reading tests) seemed to benefit from the show in relatively few goal areas, although target third and fourth graders on the average were performing well at pretest.

It is inevitable that the question will be raised as to whether these statistically significant results, replicated in two sites and four grades, are educationally important. As in the case of any educational program, this judgment about importance ought to be made by those who are responsible for the decisions based on that judgment. The question of whether the benefit is large enough in any grade to suggest that classes use the show will inevitably be influenced by many other factors, not least of which will be the ready availability of a television set and the attitudes of the teachers toward the show.

It is the opinion of the evaluators that the show had a believable impact on the reading achievement of classes who viewed in school and that this impact was larger for the earlier grades. All classes in the study received regular reading instruction, so that reading instruction on The Electric Company was either additional instruction or substitute instruction for classroom teaching. The size of the effect did not seem to be related to whether the teacher used the show in addition to the regular reading program (another 150 minutes per week of reading) or as a substitute for part of the regular reading program. The impact of the show in all grades must be seen in comparison with the effects of reading instruction alone. And the results indicate that viewing with teacher instruction is superior to teacher instruction alone. The results also indicate that the show is benefiting children at different levels of reading achievement and that this benefit includes a small but generally pervasive

improvement in scores on the Metropolitan -- a standardized, normed reading test.

2. What are the effects of viewing The Electric Company in school on first to fourth grade children from Spanish-background, on black children, and on white children? What are the effects on first to fourth grade boys and girls?

The effects of viewing The Electric Company in school were quite similar for all the subgroups in the evaluation. The show seemed to provide greatest benefit to first graders for all subgroups. While the research design does not allow valid comparisons to be made among the subgroups (just viewing versus non-viewing within the subgroups), there was no suggestion from the data that marked differences existed.

3. Are there any differential effects from viewing The Electric Company in school on color TV sets versus black and white TV sets?

No systematic, significant differences in the effects of viewing in black and white or in color were noted. Although the comparisons were based on rather small sample sizes in one site only, no systematic effect was evident over all grade levels. These conclusions are based on scores indicating gains in reading skills and comprehension. Whether color versus black and white sets have differential aesthetic or motivational impacts was not the objective of the study and was not investigated.

4. What are the effects of viewing The Electric Company at home on first to fourth grade classes? What are the effects of viewing at home on second grade children who score in the lower half of their grade on normed reading achievement tests? What are the effects of viewing at home on third and fourth grade children who score in the bottom quartile on normed reading achievement tests?

5. Does frequency of viewing affect the show's impact on children viewing at home?

The experimental design to evaluate at-home viewing broke down in that control children viewed almost as much as experimental, encouraged-to-view children. Thus, not surprisingly, analyses in which the gains of these two groups were compared failed to find systematic, significant differences across the grades and among the several target groups.

Amount of viewing did not seem to have any systematic, significant effect upon scores. Some consideration must be given to the problem of the assessment of amount of viewing in interpreting this result. It is exceedingly difficult (and expensive) to obtain an assessment of this variable that is free of obvious potential errors or biases. The study used two different measures of amount of viewing the show and found them to be only moderately correlated. Whether a composite or each measure considered separately were used to assess amount of viewing, no clear effect at any grade level could be found. One possible conclusion is that amount of viewing the sho did not seem to influence at-home viewers' scores. An alternative hypothesis that the measures of viewing were too error prone is also possible. While it is true that in previous studies (of Sesame Street) similar measures of amount of viewing did not cloud the presence of significant effects, it is possible that the effects of The Electric Company are smaller. And if they are smaller they are more likely to be missed when imprecise instruments are involved.

It is also reasonable to speculate that the show simply did not have much positive direct impact when viewed at home. One would presume that without preparation and follow-up activities such as teachers usually supply, and with the added distractions and the different approach to viewing that the home usually does supply, at-home viewing suffers in relation to in-school viewing. All this, however, is speculative.

6. Does The Electric Company affect the attitudes of children toward reading or toward school?

7. Does The Electric Company affect attitudes of teachers or parents toward the children and their reading performance? What are the attitudes of teachers toward the show?

As far as they were assessed, The Electric Company did not affect the attitudes of children toward reading or toward school. Presumably the impact of the show is relatively slight in relation to all the other factors involved in forming and changing these attitudes. Similarly the show did not seem to affect the attitudes of teachers toward their students or toward their students' reading performance. There was evidence that the show had some effect on parental attitudes toward their children's reading performance. Among parents of those first grade children who viewed in school, there was greater confidence that their children were achieving at or above an average level in reading than among parents of the control, non-viewing first grade children.

The great majority of teachers in all four grades involved in the study whose classes viewed in school were generally favorable

toward the show. There were exceptions and a few teachers were not favorable. Most, however, felt that the show was useful both in teaching (or reviewing) many of the skills of reading taught on the show and in holding the attention of the children. The teachers in the at-home viewing study seemed to be somewhat more favorably disposed to the show and many expressed a wish to use it in their classrooms.

D. Future Research

ETS is currently continuing its evaluation of The Electric Company to provide information about the long term effects of viewing in school and about the quality of the show to prevent reading problems. The follow-up study is being conducted only in the two in-school viewing sites, Fresno and Youngstown, since viewing or non-viewing of the show can be tightly controlled in these sites. The study is concerned with only the first and second grade children from the first year (who are now in second and third grades) since they are the groups of most concern and they are still within the grade range that the show is aimed at.

To a large extent children from the first year study did not remain in intact classes but rather were mixed up into classes that in this year contain some children who viewed and some who did not view. Within a school, these new classes were randomly assigned to viewing and non-viewing conditions. In this way, effects of viewing the show will be assessed for children who viewed for two years and for children who viewed for only one of the two years by comparisons with children who did not view at all.